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PAPERS FROM THE HOPKINS-STANFORD GALAPAGOS EXPEDITION, 1898–1899.

XVI.

BIRDS.

BY ROBERT EVANS SNODGRASS AND EDMUND HELLER.

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INTRODUCTION.

THE succession of families and genera followed in this paper is that of the American Ornithologists' Union. Trinomials are applied according to A. O. U. canons of nomenclature, *i. e.*, when forms overlap in their variations, regardless of the possibility or impossibility of their interbreeding, they are called subspecies. A number is given to each species of a genus, and this number is intended to stand, not for the form first named, but for the sum of all the subspecies, where subspecies that compose the species occur, not this number and a letter for each of the other subspecies as in the A. O. U. Check List. Each variety of a species is lettered. Thus: 63, *Geospiza fortis* consists of 63*a*, *G. fortis fortis;* 63*b*, *G. fortis fratercula*, etc.; not 63, *Geospiza fortis;* 63*a*, *G. fortis fratercula*, etc.

Subspecies are arranged in the order of their apparent relationships, not according to priority of description.

All measurements, unless otherwise stated, are in millimeters. Measurements of length are in all cases of the specimen before being skinned.

Family SPHENICIDÆ.

Genus **Spheniscus** Brisson.

Spheniscus Brisson, Ornithologist, vi, p. 96, 1760.

Range. — Antarctic regions, southern parts of South America and Africa, and the Galapagos Archipelago.

1. SPHENISCUS MENDICULUS Sundevall.

Spheniscus mendiculus Sundevall, Proc. Zool. Soc. Lond., pp. 126, 129, 1871 (James Island, Galapagos). — Ridgway, Proc. U. S. Nat. Mus., xix, p. 660, 1896.—Rothschild and Hartert, Novit. Zool., vi, p. 199, 1899.

Range. — Galapagos Archipelago: Charles, Seymour, James, Duncan, Albemarle and Narboro.

This species is most common at Tagus and Iguana Coves on Albemarle, about Narboro, and on the east side of the Seymour Islands. It probably seldom if ever occurs at the more northern islands of the group — Abingdon, Bindloe, Tower, Wenman and Culpepper. We did not see it at any of these islands or at Chatham or Barrington. Captain Noyes told us that he once saw one at Wenman Island. If so this is the only record of the occurrence of the family north of the equator, Wenman Island lying in 1°20′ N.

The species is said to be closest to *S. magellanicus* of the southern part of South America, ranging northward to southern Chile on the west, to Rio Grande do Sul on the east, and inhabiting the Falkland Islands and South Georgia. It differs from this species in being smaller and in having a longer and more slender bill.

We have four specimens from Tagus Cove, all of them having a pale brownish-gray inner margin to the dorsal edge of the wings. The skin about the bill is pinkish-purple; the upper mandible black, yellow at the base, and with a light spot on the side before the nostril; lower mandible black on the distal third, the rest pale yellowish.

The birds sit most of the time on the rocks near the shore, from which, when disturbed, they simply drop off into the water. When sitting in an upright attitude the body is for the most part held perpendicular, but it is bent forward somewhat at the middle of the spine, giving the bird a sort of humpbacked appearance. The wings

are suspended at the sides, but held a little away from the body so that from a distance one can see between the wings and the body. When sitting in a horizontal attitude, as they do when evidently taking their ease, generally on the top of some rock, the same hump is conspicuous at the middle of the back, the wings are held downward at right angles to the body, clasping the sides of the rock as if to help retain the position there. The wings are never held back against the sides of the body in ordinary bird fashion. The bill is nearly always directed upward at a small angle. During progression on land they hop with both feet together, keeping the body erect, and present a very awkward and clumsy appearance; but in the water they are exceedingly graceful. When quietly floating the bill is inclined a little upward as when they sit on the rocks. They swim entirely by means of the wings, the feet being held close together and extended straight behind the body, acting apparently as a rudder. On the surface they swim rather slowly, and an up-and-down bobbing motion is imparted to the body. Beneath the surface they go in any direction with great rapidity, having then more the appearance of a fish or seal than of a bird. They also leap from beneath the water into the air and dive back again just as does a seal or porpoise when breaching.

Occasionally they make a sort of grunt, and also utter deep elongated sounds resembling *hä-ä-ä-äh*, the stress gradually declining toward the end. This latter note seems to be a call from one bird to another, but when uttered no obvious reason appears why they should thus call to one another. We did not find them nesting and did not see any of them mated.

Family STERCORARIIDÆ.

Genus **Stercorarius** Brisson.

Stercorarius Brisson, Ornithologist, vi, pp. 149, 150, 1760.

Range. — Breeding in arctic and subarctic regions, migrating in winter south into the tropics.

2. STERCORARIUS POMARINUS (Temminck).

Lestris pomarina Temminck, Manuel d'Ornithologie, p. 514, 1815.
Stercorarius pomarinus Rothschild and Hartert, Novit. Zool., vi, p. 192, 1899 (Galapagos).

Range. — Nearctic and palæarctic, south in winter to Africa, Australia and South America. Galapagos Archipelego (accidental).

One immature female reported by Rothschild and Hartert, taken by the Harris expedition in December.

Family LARIDÆ.

Genus **Larus** Linnæus.

Larus Linnæus, Syst. Nat., ed. x, i, p. 136, 1758.

Range. — Cosmopolitan. Galapagos Archipelago.

3. LARUS FULIGINOSUS Gould.

Larus fuliginosus Gould, Zool. Voy. Beagle, iii, Birds, p. 141, 1841 (Galapagos). — Ridgway, Proc. U. S. Nat. Mus., xix, 1896, p. 635. — Rothschild and Hartert, Novit. Zool., vi, p. 189, 1899.

Range. — Galapagos Archipelago: Chatham, Hood, Charles, Barrington, Indefatigable, James, Albemarle, Narboro, Abingdon, Bindloe and Tower. Common about nearly all the islands except Wenman and Culpepper where it appears to be absent. We have four specimens taken at Tagus Cove, Albemarle, in January.

They are extremely noisy birds. When one is about to alight to feed, whether alone or with others, it begins to utter harsh, elongated sounds repeated in quick succession and long continued. Often, when uttering the notes, the bird stands with the foreward part of the body depressed. Often also, they utter a sound composed of a monotonous series of closely repeated guttural notes resembling *äh äh äh äh ähähäh*. There is never any apparent reason why they should utter these sounds.

4. LARUS FRANKLINII Swainson and Richardson.

Larus franklinii Swainson and Richardson, Faun. Bor. Amer., ii, p. 424, pl. 71, 1831.

Range. — Interior of western North America, south in winter to South America; Galapagos (accidental).

We have one specimen, an immature male, taken at Mangrove Point, Narboro, in March. This is the only record of the species from the Galapagos, though it is said to be plentiful in winter on the coast of Ecuador and Peru.

Genus **Creagrus** Bonaparte.

Creagrus Bonaparte, Naumannia, p. 211, 1854.

Range. — Galapagos Archipelago, coast of Peru, Malpelo Island.

5. CREAGRUS FURCATUS (Néboux).

Larus furcatus Néboux, Rev. Zool., p. 290, 1840; Voy. Venus, Atlas, pl. x, 1846 ("Monterey, California" — probably a mistake).
Creagrus furcatus Salvin, Trans. Zool. Soc., ix, p. 506, 1876 (Galapagos). — Ridgway, Proc. U. S. Nat. Mus., xix, p. 638, 1896.
Xema urcata Rothschild and Hartert, Novit. Zool, vi, p. 190, 1899.

Range. — Galapagos Archipelago: Chatham, Hood, Seymour, James, Albemarle, Narboro, Tower, Wenman and Culpepper. Coast of Peru and Malpelo Island.

This species was first reported by the *Venus* from Monterey, California. Presumably this is a mistake through confusion of labels, for on the same cruise the *Venus* collected at the Galapagos and should have gotten the gull there where it is abundant.

It is a common bird of the Galapagos, frequenting nearly all the islands. We found it in December specially abundant at Wenman and Culpepper. Large numbers of these birds were nesting on the cliffs of the small islet lying near the main island of Wenman. Apparently they nest only on the cliffs, for none was found on the upper surface of the island where many boobies and frigate birds were nesting. It is an extremely noisy species. As the birds sit on the cliffs they utter shrill elongated notes having a sort of weary tone to them. They often vary this sound by breaking up the first or the last part into a series of closely connected chattering notes. At other times they open the mouth widely and make a harsh guttural sound, consisting of one note repeated several times in quick succession. This sound differs from the reiterated one accompanying the continuous notes in being much less guttural and in having a flatter tone and a pitch about the same as the continuous shrill part. The birds utter some or all of these sounds almost continually, and when many are together they make a great deal of noise. They utter the same notes while flying.

The bird lays a single egg on a ledge of the cliff, constructing no nest. Two specimens of eggs have a light yellowish-brown ground color, and are blotched with a few large purplish-brown paler spots, and darker, smaller ones of dark brown. The markings are evenly scattered about over the surface, and are much more numerous on one than on the other. In shape they are ovate and measure 65×48 and 68×45.

We were at Albemarle Island from January 1 till January 20 before we saw any individuals of this species. On the latter date we took one at Tagus Cove; after this we saw several here every day, and in February they became common.

We have four specimens from Culpepper, Wenman and Albemarle.

Genus **Sterna** Linnæus.

Sterna Linnæus, Syst. Nat., ed. x, 1, p. 137, 1758.

Range. — Cosmopolitan. Galapagos Archipelago.

6. STERNA FULIGINOSA Gmelin.

Sterna fulginosa GMELIN, Syst. Nat., I, p. 605, 1788. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 191, 1899 (Culpepper and Wenman Islands, Galapagos).

Range. — Tropical and subtropical shores everywhere. In the eastern Pacific: Revillagigedo, Clipperton and Cocos Islands, west coast of Mexico, west coast of South America, Galapagos Archipelago.

Reported by Rothschild and Hartert as taken by the Harris expedition at Wenman and Culpepper. We observed it at these islands in December, but did not secure any specimens.

Genus **Anous** Stephens.

Anous STEPHENS in Shaw's Gen. Zool., XIII, p. 139, 1826.

Range. — Intertropical. Galapagos Islands.

7. ANOUS STOLIDUS GALAPAGENSIS (Sharpe).

Megalopterus stolidus GOULD, Zool. Voy. Beagle, III, Birds, p. 146, 1841 (Galapagos).

Anous galapagensis SHARPE, Phil. Trans., CLXVIII, p. 469, 1879 (Galapagos). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 642, 1896.

Anous stolidus galapagensis ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 191, 1899.

Range. — Galapagos Archipelago: Charles, Hood, Chatham, Barrington, Seymour, Duncan, James, Albemarle, Narboro, Abingdon, Bindloe, Tower, Wenman and Culpepper.

This is a very abundant species throughout the archipelago. It is very similar to *A. stolidus ridgwayi* Anthony of Cocos and Clipperton Islands, but differs from this subspecies in being slightly darker and in having a more dusky tone to the back and upper tail coverts, and also in having the gray of the upper part of the head darker. One of the Cocos specimens in our collection, however, has the tone of this color indistinguishable from that of the Galapagos specimens. The under parts also of *A. s. galapagensis* are darker, having a more dusky shade.

Our collection contains three adult males and two adult females, all taken in January.

At Tagus Cove, Albemarle, these birds were very abundant about the high cliffs facing the ocean. They began to mate about January 21 and on the first of February we found eggs. Each bird lays a single egg. The nests were placed in holes in the faces of the tufa cliffs about the cove, and were often so low that they could be reached

from a boat. The nest was in all cases a scant affair, consisting of a few twigs laid in the bottom of the cavity. The eggs are slightly elongate-ovate. The color is creamy white, marked with a few small light and dark blotches of brown, most numerous about the large end; one egg having the rest of the surface almost plain. Two specimens measure: 50 × 34 and 48 × 35. We found them nesting on James Island in April.

Family DIOMEDEIDÆ.

Genus **Diomedea** Linnæus.

Diomedea LINNÆUS, Syst. Nat., ed. x, I, p. 132, 1758.

Range. — Entire Pacific Ocean and southern seas in general. Galapagos Archipelago.

8. DIOMEDEA IRRORATA Salvin.

Diomedea exulans WOLF, Ein Besuch auf den Galapagos Inseln, p. 13, 1879.
Two kinds of Albatrosses HABEL, Trans. Zool. Soc. Lond., IX, p. 458, 1876.
Diomedea exulans and *D. nigripes* RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 646, 1896.
Diomedea irrorata SALVIN, Proc. Zool. Soc. Lond., p. 430, 1883 (Callao, Peru); Cat. Birds Brit. Mus., XXV, p. 445, pl. 8, 1896. — ROTHSCHILD, Bull. Brit. Ornith. Club, VII, p. 51, 1898. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 192, 1899.

Range. — Galapagos Archipelago and coast of Peru. The home of this species appears to be restricted to the eastern end of Hood Island. Albatrosses have long been known to exist at the Galapagos Islands, but the specimens brought back by the Harris expedition in 1898 were the first to be certainly identified. They were determined by Rothschild and Hartert to be *Diomedea irrorata*, a species described in 1883 by Salvin from a specimen taken at Callao, Peru, evidently a wanderer from the Galapagos, for no others have been taken on the mainland.

Albatrosses are frequently to be seen among the islands of the archipelago, but they breed only at the eastern end of Hood Island. There is here a large rookery which has long been known to whalers and made to supply eggs for eating. At the time of our visit to Hood Island in May the albatrosses were nesting. The nests were scattered about on the ground in open places among the bushes, averaging about twenty-five feet apart. A few of the birds were in pairs, apparently not yet nesting; but most of them were sitting on one egg each. When disturbed they attempted to frighten away the intruder by loudly snapping the beak.

We have seven eggs taken in May. They are somewhat elongate-

ovate, not much narrowed at the smaller end. The ground color is dull whitish; the surface is finely speckled with cinnamon color, sometimes sparsely spotted about the larger end with small brown blotches, but generally with a dark cap at the larger end of closely speckled brown, extending for a varying distance toward the smaller end of the egg, but always disappearing at one third of the distance, often narrowly confined at the end. They measure 111×74; 112×74, 108×72; 113×71; 112×74; 10×569; 113×72.

Family PROCELLARIIDÆ.

Genus Puffinus Brisson.

Puffinus Brisson, Ornithologist, VI, p. 131, 1760.

Range. — Cosmopolitan. Galapagos Archipelago.

9. PUFFINUS OBSCURUS SUBALARIS (Ridgway).

Puffinus tenebrosus? Townsend, Proc. U. S. Nat. Mus., XIII, p. 142, 1890 (Galapagos).

Puffinus tenebrosus Townsend, Bull. Mus. Comp. Zool., XXVII, No. 3, p. 126, 1895 (Galapagos).

Puffinus subalaris Ridgway (from Townsend's MS.), Proc. U. S. Nat. Mus., XIX, p. 650, 1896 (Galapagos).

Puffinus obscurus subalaris Rothschild and Hartert, Novit. Zool., VI, 1899, pp. 194, 1895.

Range. — Galapagos Archipelago.

We quote the name of this form as a subspecies of *Puffinus obscurus* from Rothschild and Hartert, having no material with which to make comparisons.

The bird is common about the Galapagos Islands, but it does not appear to breed at many places. At Wenman it was common in December, and was found on the main island in a cave near the south end of the east shore. In the cave the birds were rather timid and sought the darker parts of it when approached. When disturbed while sitting on the floor and on ledges of the walls, they made no resistance but simply got out of the way of the intruder by retreating farther back into the cave or beneath loose rocks. They could not be driven out. One bird was found here sitting on an egg which she could not be made to leave, although she only passively resisted its being taken by remaining motionless upon it. The egg was deposited upon the bare ground near the wall of the cave. It is plain white, somewhat elongate-ovate, and measures 52 × 35.

We have three adult male and three adult female specimens taken in December and January.

Genus **Æstrelata** Bonaparte.

Æstrelata BONAPARTE, Consp. Av., II, p. 188, 1856.

Range. — Cosmopolitan. Galapagos Archipelago.

10. ÆSTRELATA PHÆOPYGIA Salvin.

Æstrelata phæopygia SALVIN, Trans. Zool. Soc. Lond., IX, p. 507, 1876 (Galapagos). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 648, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 198, 1899.

Range. — Galapagos Islands.

We did not meet with this species about the archipelago until March 4. After this it became a very frequent bird, but nowhere did we find it breeding.

We have four specimens from off Iguana Cove, Albemarle, two taken in March and two in June. The bill is black, the tarsus and the basal third of the toes livid whitish, the rest of the toes and the claws black.

MEASUREMENTS OF ADULT SPECIMENS OF *Æstrelata phæopygia*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Depth of Bill at Base.	Width of Bill at Base.	Tarsus.	Middle Toe.
4309	Albemarle	♂	415	284	155	34	25	15	14	37	45
5097	"	♀	405	295	143	34	24.5	16	15	38	45
5091	"	"	400	285	150	33	24.5	15	15	36	43
4317	"	"	408	295	157	33	24.5	15	14	37	41

Genus **Procellaria** Linnæus.

Procellaria LINNÆUS, Syst. Nat., ed. X, I, p. 131, 1758.

Range. — Cosmopolitan. Galapagos Archipelago.

11. PROCELLARIA TETHYS Bonaparte.

Procellaria tethys BONAPARTE, J. f. Orn., p. 47, 1853; Compt. Rend., XXXVIII, p. 662, 1854 (Galapagos). — TOWNSEND, Bull. Mus. Comp. Zool., XXVII, No. 3, p. 126, 1895 (Galapagos). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 656, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 199, 1899.

Range. — Galapagos Archipelago, Cocos Island and neighboring waters. This bird is to be found throughout the archipelago, but is specially abundant about Iguana Cove at the southern end of Albemarle and at Mangrove Point, Narboro. Townsend reports it from four

hundred miles east of the Galapagos and we observed it north of the Galapagos Islands in the latitude of Cocos Island.

We have ten specimens taken at Iguana Cove, Albemarle and Mangrove Point, Narboro, in December and April.

Genus **Oceanodroma** Reichenbach.

Oceanodroma Reichenbach, Syst. Av., p. 4, 1852.

Range. — Cosmopolitan. Galapagos Archipelago.

12. OCEANODROMA CRYPTOLEUCURA (Ridgway).

Cymochorea cryptoleucura Ridgway, Proc. U. S. Nat. Mus., iv, p. 337, 1882 (Hawaiian Islands).

Oceanodroma cryptoleucura Townsend, Bull. Mus. Comp. Zool., xxvii, p. 125, 1895 (Wenman Island, Galapagos). — Ridgway, Proc. U. S. Nat. Mus., xix, p. 654, 1896. — Rothschild and Hartert, Novit. Zool., vi, p. 198, 1899.

Range. — Hawaiian and Galapagos Islands in the Pacific, St. Helena, Madeira and Cape Verde Islands in the Atlantic.

We have no specimens of this species. It has been taken at the Galapagos Islands only by Townsend.

Genus **Oceanites** Keys. and Blas.

Oceanites Keyserling and Blasius, Wirblth. Europ., i, p. xciii, 1840.

Range. — Cosmopolitan. Galapagos Archipelago.

13. OCEANITES GRACILIS (Elliott).

Thalassadroma gracilis Elliott, Ibis, p. 391, 1859 (west coast of South America).

Oceanites gracilis Ridgway, Proc. U. S. Nat. Mus., xix, p. 658, 1896 (Galapagos). — Rothschild and Hartert, Novit. Zool., vi, p. 198, 1899.

Range. — Coast of Chile and the Galapagos Archipelago.

We have eleven specimens taken at Iguana Cove and Tagus Cove, Albemarle, in December and January. The species occurs at nearly all of the islands, but nowhere did we find it breeding.

Family **PHAËTHONTIDÆ.**

Genus **Phaethon** Linnæus.

Phaëthon Linnæus, Syst. Nat., ed. x, i, p. 134, 1758.

Range. — Intertropical seas. Galapagos Archipelago.

14. PHAËTHON ÆTHEREUS Linnæus.

Phaëthon æthereus LINNÆUS, Syst. Nat., ed. x, I, p. 134, 1758. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 600, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 180, 1899.

Range. — Tropical seas in general.

We observed this species all the way from Guadalupe Island off Lower California to the Galapagos Archipelago. At the latter locality we found it most abundant at Wenman, Culpepper, Hood and Brattle, but nowhere did we find it nesting. The Harris expedition report it as nesting on the eastern end of Hood Island in October.

This is the only species of *Phaëthon* that has been observed at the Galapagos Islands, although *P. rubicaudus* is rather common in the eastern Pacific north of the Galapagos.

Family SULIDÆ.

Genus Sula Brisson.

Sula BRISSON, Ornithologist, VI, p. 495, 1760.

Range. — Temperate and tropical seas.

15. SULA VARIEGATA Tschudi.

Dysporus variegatus TSCHUDI, Fauna Peruana, Ornithologist, p. 313, 1845 (Peru).

Sula cyanops RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 595, 1896 (Galapagos — quoted from Sundevall).

Sula variegata ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 178, 1899.

Range. — Coasts of Chile and Peru. Galapagos Archipelago: Culpepper, Wenman, Tower, James, Brattle, Charles and Hood.

This species is common on the most northern and most southern islands of the Archipelago — Wenman, Culpepper, Tower and Hood — but seldom visits the central islands. We never saw it at Tagus Cove, Albemarle, where we spent several months, and at Elizabeth Bay, Albemarle, we saw only a few in February flying over Perry Isthmus which separates the northern half of Albemarle Island from the southern half.

The coloration in life of the naked parts of the adults is as follows: Bill light orange-red, yellowish at the tip and along the commissure; skin about the eyes deep greenish-black, a light spot beneath the eye; gular sac blackish.

On Culpepper this species was found on the tenth of December just beginning to nest. A few birds were seen sitting on eggs, but most of them were in pairs defending nesting sites. The nests consisted merely of slight depressions scraped in the soil.

On Wenman this *Sula* was very abundant and the nesting season here, from the thirteenth to the twenty first of December, was somewhat more advanced than we found it on Culpepper Island. The birds were nesting in considerable numbers on the small, flat topped island lying to the north of the main island. There is no soil on this island and the females deposited their eggs on the flat surface of the rocks. We did not see any nesting on the ledges of the low cliffs forming the sides of the island. No nest is constructed, and generally only one egg is laid by each female. On Culpepper we saw some nests containing two. They snap their beaks viciously at the foot or leg of the intruding person, and a nesting bird cannot be forced to leave her egg. Even those that are not nesting can scarcely be made to fly. The birds are extremely noisy. When approached they utter loud, harsh, squawking sounds, which become louder and more rapid the more they are disturbed. They utter also a sort of whistling sound made apparently in the lower part of the throat while the mouth is held wide open. This whistle is generally preceded by a blowing sound. Birds with eggs make no sounds different from those made by others. One bird when annoyed by poking it with a stick uttered only the loud squawking, while another, disturbed in the same manner, uttered only the whistling notes and could not be induced to make any other sound. Generally, however, the same bird made both of the sounds, changing at short intervals from one to the other. The squawking sound is the one most commonly uttered.

MEASUREMENTS OF ADULT SPECIMENS OF *Sula variegata*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Depth of Bill at Base.	Tarsus.	Middle Toe.
3835	Culpepper.	♂	830	430	230	101	43	53	83
3837	"		880	455	233	111	41	55	80
3838	"	♀	860	450	220	106	39	55	78
3839	"		855	452	220	109	41	54	83
3877	Wenman.	♂	805	450	230	100	42	56	78
3839	"	♀	845	448	230	103	43	53	77
4136	"		800	430	225	101	43	54	77

A bird just out of the egg and not yet having its eyes open, was observed lying squirming on the ground, uttering in slow succession low chuckling notes. There was no apparent reason why it should be making these sounds.

Two sets of two eggs each were taken on Culpepper. In color they

are like those of other species of *Sula*. They measure 65 × 46, 62 × 44, and 70 × 44, 70 × 46.

We did not find this *Sula* nesting on Tower when this island was visited in June. A few of the birds were seen about the northeast part of the island.

We have four adult specimens of this bird from Culpepper Island, two from Wenman, one from Tower, and one immature female from Barrington.

The young of *Sula variegata* somewhat resemble in general coloration the adults of *Sula brewsteri* and it may be that the birds reported by Kinberg and by Baur and Adams as the latter species were simply the immature of *S. variegata*. For some reason the young of this species is very rarely seen about the islands. We have one specimen taken at Barrington Island in May — the only immature individual of *S. variegata* that we saw. There is no authentic record of the occurrence of *S. brewsteri* at the Galapagos Archipelago, although it is a common bird at Cocos Island, which lies about four degrees north and to the east of the Galapagos.

16. SULA PISCATRIX WEBSTERI (Rothschild).

Sula piscator Ridgway, Proc. U. S. Nat. Mus., xix, p. 598, 1896 (Galapagos).

Sula websteri Rothschild, Bull. Brit. Ornith. Club, vii, p. 52, May, 1898 (Clarion Island, Galapagos Islands).

Sula piscatrix websteri Rothschild and Hartert, Novit. Zool., vi, p. 177, 1899.

Range. — Revillagigedo Archipelago. Cocos Island. Galapagos Archipelago: Culpepper, Wenman, Tower and Hood.

We have four adult specimens in the white plumage, taken in December from Wenman and Culpepper, and three taken in November and August from Clarion Island of the Revillagigedo Archipelago. All of them have the tails mostly dark brownish as described by Rothschild; the females do not differ from the males in color. We have also six immature birds in the brownish plumage taken at Wenman and Culpepper in December and at Cocos Island in July, and one grayish bird taken from Culpepper in December.

The species is easily distinguished at all ages from all other species of *Sula* of the eastern Pacific by its bright red feet. In adults there is a narrow band of red on the bare skin about the base of the upper mandible and a large quadrate patch of the same color at the base of each ramus of the lower mandible; the skin about the eye is blue, with an elongate spot of pink in it below the eye; the gular membrane

and the skin back of the base of the lower mandible are purplish-black.

We found this species nesting on Culpepper and Wenman in December, on Hood in May and on Tower in June; but it was seen nowhere else in the archipelago. Hence it is coincident in its range at the Galapagos with *Sula variegata*.

At Wenman Island we found it abundant in December on the small islet off the north side of the main island. Nests were numerous and were always placed in the low bushes that cover most of the island. The birds were never observed to alight anywhere else than in these bushes when they came to the island. The most common sound they uttered consisted of a short series of hoarse, guttural notes.

On Tower, also, they always nested in the bushes. Here the nests were placed four or five feet above the ground and consisted of twigs somewhat woven together into a circular form with a shallow depression above. Sometimes a few dry leaves were placed in the bottom of the cavity. The incubating bird holds the single egg between her feet. None of the nests at this time on Tower Island contained young birds.

This habit of nesting in trees or bushes distinguishes this species from all the other *Sulas* of the eastern Pacific, and the species occurs on all the tropical islands of this region except Clipperton, where vegetation is is wholly lacking.

MEASUREMENTS OF ADULT SPECIMENS OF *Sula piscatrix websteri*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Depth of Bill at Base.	Tarsus.	Middle Toe.
4282	Wenman.	♂	720	371	212	85	36	35	58
4273	"	"	750	385	247	85	31	39	63
3841	"	♀	705	395	220	85	34	34	59
3840	"	"	775	393	223	92	37	35	64
5024	Clarion.	♂	760	407	235	88	34	36	61
3842	"	♀	750	403	218	89	32	39	63
5009	"	"	765	395	240	88	34	38	65

On Culpepper, Wenman and Tower, birds in the white plumage were very scarce compared with the number of those in the immature brownish plumage. The majority of nests containing eggs or young birds we found occupied by one of these fully grown but brownish birds. These individuals were certainly immature, but must have

been at least six months old. They were fed by the adults with disgorged flying fish (*Exocœtus volitans*) and young specimens of *Hemiramphus*. These immature birds appear to remain on the nest for a long time, perhaps nearly a year, being fed by the parents; and reciprocate by incubating the eggs. The young when just hatched are naked, but soon become covered with a white down.

17. SULA NEBOUXI Milne-Edwards.

Sula nebouxi MILNE-EDWARDS, Ann. Soc. Nat. Zool., XIII, p. 37, pl. 14, 1882 (Chile).—RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 596, 1896 (Galapagos).—ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 596, 1899.

Range. — Pacific coast of tropical America and the Galapagos Islands.

This is the most common and most widely spread *Sula* of the archipelago. We observed it about all of the islands except Culpepper, although at Wenman it is rare. Its breeding habits are different from those of both *S. variegata* and *S. piscatrix websteri* in that it invariably nests on cliffs. During the winter the cliffs about Tagus Cove, Albemarle, afford a roosting place for a large number of these birds, who sit on the ledges in an almost upright position, seldom assuming the squatting goose-like attitude of the other two species. They are very quiet birds; even when a large number are together on the face of a cliff it is only occasionally that one is heard to make any sound. Their notes and their voice are very similar to those of *S. variegata*, consisting of a harsh squawk and a whistling sound. They are expert divers and often drop almost vertically head downward from great heights into the water in order to capture a passing fish. Under the water they turn and soon come to the surface. The Harris expedition reports this species as breeding on Hood and Gardner (near Charles) Islands during the latter part of October and on Abingdon Island in August. We found it nesting on Albemarle and Narboro in March and on Hood in May.

MEASUREMENTS OF ADULT SPECIMENS OF *Sula nebouxi*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Depth of Bill at Base.	Tarsus.	Middle Toe.
4220	Albemarle.	♂	835	425	247	106	37	50	70
4344	"	♀	878	442	244	108	38	55	75
4032	Narboro.	"	870	440	255	111	37	53	78

Our collection contains two adult females and one adult male taken about Albemarle and Narboro in January, February and March.

In life the bare parts of the bird are colored as follows: bill slate-blue; bare skin of sides of head and about base of bill grayish-blue; gular sac light blue; iris varying from cream color to straw-color; tarsus and toes bright pea-green to blue-green, webs blue-green to indigo; claws grayish-dusky.

Family PHALACROCORACIDÆ.

Genus **Phalacrocorax** Brisson.

Phalacrocorax Brisson, Ornithologist, vi, p. 511, 1760.

Range. — Cosmopolitan except Polynesia. Galapagos Archipelago.

18. PHALACROCORAX HARRISI Rothschild.

Phalacrocorax harrisi Rothschild, Bull. Brit. Ornith. Club, vii, p. 52, 1898. — Rothschild and Hartert, Novit. Zool., vi, p. 179, 1899 (Galapagos).
Nannopterum harrisi Sharpe, Gen. and Spec. Birds, p. 235, 1899.

Range. — Galapagos Archipelago: Narboro and Albemarle.

This species was first obtained by the Harris expedition. It is surprising that so striking a bird should never have been reported before.

Our collection contains seven specimens from Narboro and Albemarle. They all agree with Rothschild's description of the *type*, but show in addition a greenish iridescence on the upper parts. The color below varies considerably. Some of the darkest males from Narboro are seal brown below. A nesting female from Albemarle is light tawny on the breast, a little darker on the abdomen. The gular sac in life is livid-purplish, or brownish-purple; the iris emerald; the upper mandible black with pale brown tip and tomia; the lower mandible light brown with darker tomia; the feet and webs black, claws slaty black. The pupil is elliptical with the longer diameter horizontal.

Occurs abundantly in the surf and on the shore and rocks of Narboro. A few also were found along the shores of Banks Bay and at Black Bight, Albemarle. The birds are entirely unable to fly. When on shore they sit in an upright position and often extend the wings with their planes vertical, somewhat in the manner of vultures while digesting their food. In the water they have a very graceful appearance, carrying the neck bent in a very swanlike fashion. The adults were never heard to make any sound.

The food consists largely of devilfish (*Octopus*), which the birds obtain by diving. Some were observed swallowing devilfish more

than a foot in length. Fish also form a part of their food. The young are fed by the parents with disgorged food until they have attained nearly adult size. A large, immature bird may often be seen pursuing an adult through the surf with loud cries and savage thrusts of the beak, until the latter comes to terms, thrusts its beak into the open mouth of the young and disgorges into it a mass of partially digested food.

In January, at Black Bight, Albemarle, a small rookery was found, consisting of four occupied nests. The nests were placed on a flat, smooth sheet of lava at the edge of a small lagoon. They were made of brown algæ heaped up into cone-shaped masses about a foot high, hollowed out at the top to receive the eggs. A nest measured had the following dimensions: External diameter, seventy-five centimeters; internal diameter, forty centimeters; depth of the cavity, ten centimeters. The birds here were all in pairs, the females sitting on the nests, the males standing quietly nearby. The females stubbornly defended their nests when disturbed, making savage thrusts with their bills and hissing loudly. Two of the nests contained each three well incubated eggs. One of the others contained two eggs and one young, the other one egg and two young. The nestlings were black and naked. The eggs are elongate-oval or narrowly elliptical in shape and have a light bluish-green color. This color is usually, however, hidden by a white chalky deposit. The eggs of the two sets measure as follows: 71×42.5, 67×42.5, 67×43, and 68×41, 68×45, 59×41.

MEASUREMENTS OF ADULT SPECIMENS OF *Phalacrocorax harrisi.*

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Tarsus.	Middle Toe.
4086	Narboro.	♂	930	186	145	67	86	82
3912	"	"	880	188	145	75	83	81
3895	"	"	900	185	155	63	81	80
3937	"	"	910	184	165	62	73	77
3976	"	"		190	165	60	75	76
4245	Albemarle.	♀	870	180	165	65	75	75
3891	"	"	900	175	165	62	78	77

Family PELECANIDÆ.

Genus Pelecanus Linnæus.

Pelecanus LINNÆUS, Syst. Nat., ed. x, 1, p. 132, 1758.

Range.—Cosmopolitan, except Polynesia. Galapagos Archipelago.

19. PELECANUS CALIFORNICUS Ridgway.

Pelecanus fuscus SUNDEVALL, Proc. Zool. Soc., p. 125, 1871 (Galapagos).
Pelecanus fuscus (?) *californicus* RIDGWAY, Water Birds N. A., II, p. 143, 1884; Proc. U. S. Nat. Mus., XIX, p. 593, 1896 (Galapagos).
Pelecanus fuscus californicus ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 176, 1899 (Galapagos).

Range. — Pacific Coast of America from Washington to Peru. Galapagos Archipelago: Charles, Hood, Chatham, Barrington, Seymour, Indefatigable, James, Albemarle, Narboro, Abingdon, Bindloe and Tower.

Generally most abundant on the leeward side of islands, specially numerous about Tagus Cove, Albemarle, and on the east shore of Narboro, seeming to prefer places affording a considerable expanse of smooth water. Old rookeries were found on Narboro, the nests being situated in small bushes near the coast. Rothschild reports a nest of three eggs taken among the mangroves of Indefatigable in September by the Harris expedition.

MEASUREMETS OF ADULT SPECIMENS OF *Pelecanus californicus*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Tarsus.	Middle Toe.
4217	Albemarle.	♀	1290	538	150	76	307	100
3834	"	"	1300	535	145	73	305	105
4262	"	"	1290	540	136	71	305	104
3981	Narboro.	"		530	136	72	312	104

We have four adult females, all in the postnuptial plumage, and they are indistinguishable from the California specimens. The gular pouch of a female taken at Elizabeth Bay, Albemarle, in February, was colored in life as follows: Ground color very pale brown; numerous much darker lines of purplish-brown arising at the sides of the base of the pouch and running forward parallel with the ramus of the mandible on each side, meeting in the median line in pairs forming acute angles; posteriorly along the edges of the pouch the lines indistinct and the purplish color rather diffuse; veins with a greenish-blue color; bill, upper mandible horn-greenish, basally with indistinct yellowish streaks, toward the tip this color median only, sides of mandible becoming scarlet, claw lemon-yellow, with dusky shade at base; lower mandible greenish and yellowish at base, in front of this mottled with yel-

lowish, greenish and scarlet, still farther forward entirely scarlet, tip same as claw of upper mandible. Bare skin at base of bill dark purplish. Lower eyelid pink. In another specimen of the same date the ground color of the pouch was pale yellowish-green, the lines dark brown, almost no purplish color, a shade of the latter color along the rami of the mandible and edges of the throat feathers; bill colored the same as first specimen, but the lower eyelid purplish.

Family FREGATIDÆ.

Genus **Fregata** Brisson.

Fregata BRISSON, Ornithologist, VI, p. 506, 1760.

Range.—Intertropical seas.

20. FREGATA AQUILA (Linnæus).

Pelecanus aquilus LINNÆUS, Syst. Nat., ed. X, I, p. 133, 1758.
Fregata aquila RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 590, 1896 (Galapagos).—ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 175, 1899.
Fregata aquila minor RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 591, 1896 (Galapagos).

Range. — Intertropical and subtropical seas. Galapagos Islands.

Common everywhere about the archipelago, observed at all the islands. Found nesting on Culpepper and Wenman in December, and on Tower in June.

Family ANATIDÆ.

Genus **Anas** Linnæus.

Anas LINNÆUS, Syst. Nat., ed. X, I, p. 122, 1758.

Range. — Cosmopolitan.

21. ANAS VERSICOLOR Vieillot.

Anas versicolor VIEILLOT, Nouv. Dict. d'Hist. Nat., V, p. 109, 1816.
Querquedula versicolor SALVIN, Trans. Zool. Soc. Lond., IX, p. 499, 1876 (Galapagos). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 614, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 183 ,1899.

Range. — Southern part of South America and the Galapagos Archipelago.

One specimen said to have been taken by Kinberg. None reported from the Galapagos since.

Genus **Pœcilonetta** Eyton.

Pœcilonetta EYTON, Monogr. Anatidæ, p. 16, 1838.

Range. — South America, West Indies, Bahamas, Galapagos.

22. PŒCILONETTA BAHAMENSIS GALAPAGENSIS (Ridgway).

Pœcilonetta bahamensis GOULD, Zool. Voy. Beagle, III, Birds, p. 135, 1841 (Galapagos).

Pœcilonetta galapagensis RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 115, 1890 (Galapagos); Proc. U. S. Nat. Mus., XIX, p. 612, 1896.

Pœcilonetta bahamensis galapagoensis ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 183, 1899.

Range. — Galapagos Archipelago.

We simply follow Rothschild and Hartert in giving this form as a subspecies of *P. bahamensis*, having no material of the latter species with which to make comparisons.

This is a common species throughout the archipelago wherever suitable places occur. It is especially abundant on Albemarle, James, Charles and Chatham.

Family PHŒNICOPTERIDÆ.

Genus **Phœnicopterus** Linnæus.

Phœnicopterus LINNÆUS, Syst. Nat., ed. x, I, p. 139, 1758.

Range. — Tropical and subtropical regions. Galapagos Archipelago.

23. PHŒNICOPTERUS RUBER Linnæus.

Phœnicopterus ruber LINNÆUS, Syst. Nat., ed. x, I, p. 139, 1758. — SALVIN, Trans. Zool. Soc. Lond., IX, p. 498, 1876 (Galapagos). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 608, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 182, 1899.

Phœnicopterus glyphorhynchus GRAY, Ibis, p. 442, pl. 14, fig. 5, 1869 (Galapagos).

Range. — Atlantic coast of Mexico and Central America, southern Florida, Galapagos Archipelago: Charles, James, Indefatigable and Albemarle.

We obtained this species on the shore of the southern half of Albemarle, a short distance west of Elizabeth Bay. Only seven individuals were seen. They were wading about quietly in the small reedy marshes back of the mangrove swamps along the shore. They were very tame and reluctantly swam to the opposite side of the small ponds when approached. Only one was seen to fly and it alighted again a few yards from where it started. Another was made to run along on the surface of the water flapping its wings. The only sound they uttered was a hoarse guttural note somewhat between a squawk and a grunt, resembling a little the note of the great blue heron. Mr. G. M. Green of San Francisco reports having found the flamingoes

breeding in the salt marshes about James Bay on James Island, and he obtained eggs in August.

Family ARDEIDÆ.

Genus **Ardea** Linnæus.

Ardea LINNÆUS, Syst. Nat., ed. x, I, p. 141, 1758.

Range. — Cosmopolitan except New Zealand and Polynesia. Galapagos Archipelago.

24. ARDEA HERODIAS Linnæus.

Ardea herodias LINNÆUS, Syst. Nat., ed. x, I, p. 143, 1758. — DARWIN, Zool. Voy. Beagle, III, Birds, p. 128, 1841 (Galapagos). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 601, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 180, 1899.

Range. — Northern temperate and tropical America. Galapagos Archipelago: Seymour, Indefatigable, Duncan, Albemarle and Narboro.

We found this heron especially abundant in the mangrove swamps of the east shore of Narboro. In January we obtained here a set of three eggs. The nest consisted of a flat platform of large twigs, placed in a mangrove tree about a foot and a half above high water.

Genus **Herodias** Boie.

Herodias BOIE, Isis, p. 559, 1822.

Range. — Cosmopolitan.

25. HERODIAS EGRETTA (Gmelin).

Ardea egretta GMELIN, Syst. Nat., I, p. 629, 1788.

? Herodias egretta RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 601, 1896 (? Galapagos).

Herodias egretta ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 181, 1899 (Albemarle Island, Galapagos).

Range. — Temperate and tropical America. Galapagos Archipelago: Albemarle.

Only one specimen of the American egret has been obtained at the Galapagos; it was taken by the Harris expedition and determined by Rothschild and Hartert to be the same as South American birds. Baur and Adams reported finding on Albemarle "a rookery of white herons." We saw one individual on a small island in the center of a lake in the bottom of the large tufa crater just south of Tagus Cove, Albemarle.

Genus **Butorides** Blyth.

Butorides BLYTH, Cat. Birds, Mus. Asiat. Soc., p. 201, 1849.

Range. — North and South America, Africa, southern Asia to Australia.

26. BUTORIDES PLUMBEUS (Sundevall).

Butorides javanicus SCLATER AND SALVIN, Proc. Zool. Soc. Lond., p. 323, 1870 (Galapagos).

Ardea plumbea SUNDEVALL, Proc. Zool. Soc. Lond., pp. 125–127, 1871 (Galapagos).

Butorides plumbeus RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 602, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 181, 1899.

Range. — Galapagos Archipelago: Chatham, Hood, Charles, Barrington, Indefatigable, Seymour, Duncan, Jervis, James, Albemarle, Narboro, Bindloe, Abingdon, Tower and Wenman.

Common almost everywhere in the archipelago, especially so in the mangrove swamps of Albemarle and Narboro. They are very tame and allow one to approach them closely before they fly. When they take flight, whether frightened or not, they nearly always utter in slow succession elongated squawks. When about to alight they shorten the notes and utter them more rapidly. In February we secured a set of three eggs at Elizabeth Bay, Albemarle. The nest consisted of a loosely constructed platform of dead twigs, placed in a tree of a mangrove swamp, about eight feet above the water. The eggs are plain light green, measuring 41 × 33, 41 × 32.5, and 42 × 33. They are widest at the middle and symmetrically narrowed at each end.

Genus **Nyctanassa** Stejneger.

Nyctanassa STEJNEGER, Proc. U. S. Nat. Mus., X, p. 295, 1887.

Range. — Temperature North America and all of Middle and South America. Galapagos Archipelago.

27. NYCTANASSA VIOLACEA (Linnæus).

Ardea violacea LINNÆUS, Syst. Nat., ed. X, I, p. 143, 1758.

Nycticorax violaceus GOULD, Zool. Voy. Beagle, III, Birds, p. 128, 1841 (Galapagos).

Nyctanassa violacea RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 606, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 182, 1899.

Range. — Tropical and southern north temperature parts of America. Galapagos Archipelago: Charles, Hood, Chatham, Indefatigable, Seymour, James, Albemarle, Narboro, Bindloe and Tower.

This heron is not nearly so common about the archipelago as the last. We obtained one set of three eggs in May on Indefatigable. The nest

was on the ground in the brush about four hundred yards back from the shore at the northeast corner of the island near Seymour Island. The eggs are identical in color with those of the last species, *Butorides plumbeus*, but they are larger and the longest transverse diameter is a little nearer one end than the other, giving them a slightly ovate shape. They measure 48 × 37, 45.5 × 36, and 49 × 36.

Family RALLIDÆ.

Genus **Porzana** Vieillot.

Porzana VIEILLOT, Analyse, p. 61, 1816.

Range. — Cosmopolitan. Galapagos Archipelago.

28. PORZANA SPILONOTA (Gould).

Zapornia spilonota GOULD, Zool. Voy. Beagle, III, Birds, p. 132, pl. 49, 1841 (Galapagos).

Porzana spilonota SALVIN, Trans. Zool. Soc. Lond., IX, p. 500, 1876 (James and Indefatigable Islands).—RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 618, 1896.

Porzana galapagoensis SHARPE, Cat. Birds Brit. Mus., XXIII, p. 113, 1894 (Galapagos).—RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 619, 1896.

Creciscus spilonotus ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 184, 1899.

Range. — Galapagos Archipelago: James Island.

This species is known only from the original specimens taken by Darwin on James. We take the above synonymy from Rothschild and Hartert, who have examined the *types*.

29. PORZANA SHARPEI (Rothschild and Hartert).

Creciscus sharpei ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 185, 1899, (Indefatigable Island).

Porzana spilonota SCLATER AND SALVIN (not of Gould), Proc. Zool. Soc. Lond., p. 456, 1868; p. 323, 1870 (Indefatigable Island).—SALVIN, Trans. Zool. Soc. Lond., p. 500, 1876 (James and Indefatigable Islands) (in part).—RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 618, 1896 (in part).

Creciscus spilonotus SHARPE (not of Gould), Cat. Birds Brit. Mus., XXIII, p. 137, 1894 (Indefatigable Island).

Range. — Galapagos Archipelago: Indefatigable and Narboro.

MEASUREMENTS OF ADULT SPECIMENS OF *Porzana sharpei*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Depth of Bill at Base.	Width of Bill at Base.	Tarsus.	Middle Toe.
4017	Narboro.	♂	153	64	24.0	15.0	6.0	4.0	21	24
3994	"	♀	150	65	25.5	14.5	5.5	4.5	23	25

We have two specimens of a *Porzana*, an adult male and an adult female, taken in January in a mangrove swamp on the east shore of Narboro, which differ in no way from the description of *P. sharpei* by Rothschild and Hartert. These two specimens are the only rails that we saw, although much time was spent looking for others.

Genus **Galinula** Brisson.

Galinula Brisson, Ornithologist, VI, p. 2, 1760.

Range. — Cosmopolitan. Galapagos Archipelago.

30. GALINULA GALEATA (Lichtenstein).

Crex galeata Lichtenstein, Verz. Doubl., p. 80, 1823.
Galinula galeata Ridgway, Proc. U. S. Nat. Mus., XIX, p. 621, 1896. — Rothschild and Hartert, Novit. Zool., VI, p. 186, 1899.

Range. — Tropical and most of temperate America. Galapagos Archipelago: Albemarle.

We obtained two specimens of this species in February near Elizabeth Bay, Albemarle. The galinules were rather plentiful in the small reedy marshes and salt pools back of the mangrove swamps bordering the north shore of southern Albemarle west of Elizabeth Bay.

MEASUREMENTS OF ADULT SPECIMENS OF *Galinula galeata*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen from Top of Frontal Shield.	Width of Frontal Shield.	Depth of Bill at Base.	Width of Bill at Base.	Tarsus.	Middle Toe.
4233	Albemarle.	♂	370	183	60	45	13	13	10	54	63
4239	"	"	360	170	74	48	14	11	9	58	69

Family PHALAROPODIDÆ.

Genus **Phalaropus** Brisson.

Phalaropus Brisson, Ornithologist, VI, p. 12, 1760.

Range. — Breeding in arctic and subarctic regions of both hemispheres, migrating into the tropics.

31. PHALAROPUS LOBATUS (Linnæus).

Tringa lobata Linnæus, Syst. Nat., ed. x, I, pp. 148, 824, 1758.

Range. — Northern parts of northern hemisphere; south in winter to the tropics. Galapagos Archipelago.

We obtained two specimens of this species March 29 from a flock on the water off the southeast point of Narboro. It has not hitherto

been reported from the Galapagos. We saw the birds several times in that vicinity.

Family RECURVIROSTRIDÆ.

Genus **Himantopus** Brisson.

Himantopus Brisson, Ornithologist, vi, p. 33, 1760.

Range. — Cosmopolitan (littoral). Galapagos Archipelago.

32. HIMANTOPUS MEXICANUS (Müller).

Charadrius mexicanus Müller, Syst. Nat. Suppl., p. 117, 1776.
Himantopus mexicanus Ridgway, Proc. U. S. Nat. Mus., xix, p. 633, 1896 (Galapagos). — Rothschild and Hartert, Novit. Zool., vi, p. 189, 1899.

Range. — South temperate and tropical America. Galapagos Archipelago.

This bird is rather rare about the archipelago. They seem to prefer lakes and ponds of quiet water rather than the ocean beaches and rocks along the shore. We observed them about the lake in the crater a short distance south of Tagus Cove, Albemarle, on the ponds back of the beach at James Bay, James Island, about similar ponds on the west side of the southern Seymour Island, and at a lake on the upper part of Hood.

Family SCOLOPACIDÆ.

Genus **Tringa** Linnæus.

Tringa Linnæus, Syst. Nat., ed. x, i, p. 148, 1758.

Range. — Arctic and subarctic during the breeding season, cosmopolitan during migrations. Galapagos Archipelago.

33. TRINGA BAIRDII (Coues).

Actodromas bairdii Coues, Proc. Acad. Nat. Sci. Phila., p. 194, 1861.
Heteropygia bairdi Rothschild and Hartert, Novit. Zool., xix, p. 188, 1899 (Galapagos).

Range. — Breeding in Alaska, migrating south to the interior of North America and west coast of South America. Galapagos Archipelago.

Rothschild and Hartert report the only specimen of this species known from the Galapagos Archipelago, as taken by the Harris expedition on Barrington in October.

34. TRINGA MINUTILLA Vieillot.

Tringa minutilla Vieillot, Nouv. Dict., xxxiv, p. 452, 1819. — Sclater and Salvin, Proc. Zool. Soc. London, p. 323, 1870 (Galapagos). — Ridgway, Proc. U. S. Nat. Mus., xix, p. 631, 1896.—Rothschild and Hartert, Novit. Zool., vi, p. 188, 1899.

Range. — Northern North America, migrating over the entire American continent. Galapagos Islands.

This sandpiper is but infrequently met with on the Galapagos Islands.

Genus **Calidris** Cuvier.

Calidris Cuvier, Leç. Anat. Comp., I, pl. 2, 1800.

Range. — Cosmopolitan during migrations, breeding only in northern regions. Galapagos Archipelago.

35. CALIDRIS ARENARIA (Linnæus).

Tringa arenaria Linnæus, Syst. Nat., ed. XII, I, p. 251, 1766.
Calidris arenaria Ridgway, Proc. U. S. Nat. Mus., XIX, p. 629, 1896 (Galapagos).—Rothschild and Hartert, Novit. Zool., VI, p. 187, 1899.

Range. — Cosmopolitan during migration. Galapagos Archipelago.

Found occasionally at the Galapagos, generally in winter. The Harris expedition took one specimen, however, as early as July 29.

Genus **Helodromas** Kaup.

Helodromas Kaup, Skizz. Entw.-Gesch. Eur. Thierw., p. 144, 1829.

Range. — Cosmopolitan during migration, breeding in the northern parts of the northern hemisphere. Galapagos Archipelago.

36. HELODROMAS SOLITARIUS (Wilson).

Tringa solitaria Wilson, Amer. Orn., VII, p. 53, pl. 58, fig. 3, 1813.
Helodromas solitarius Rothschild and Hartert, Novit. Zool., VI, p. 188, 1899 (Galapagos).

Range. — Breeding in northern North America, in winter migrating south to southern South America. Galapagos Archipelago.

A chance visitor at the Galapagos during winter migrations. Rothschild and Hartert report two specimens taken October 12 on Chatham by the Harris expedition.

Genus **Heteractitis** Stejneger.

Heteractitis Stejneger, Auk, I, p. 236, 1884.

Range. — Shores and islands of the Pacific Ocean. Galapagos Archipelago.

37. HETERACTITIS INCANUS (Gmelin).

Scolopax incanus Gmelin, Syst. Nat., I, Pt. II, p. 658, 1788.
Heteractitis incanus Ridgway, Proc. U. S. Nat. Mus., XIX, p. 632, 1896 (Galapagos). — Rothschild, Novit. Zool., VI, p. 188, 1899.

Range. — Pacific coast of America and eastern islands of Polynesia. Galapagos Archipelago.

A frequent winter visitor at the Galapagos where it has been reported from nearly all of the islands.

Genus **Actitis** Illiger.

Actitis ILLIGER, Prodr., p. 262, 1811.

Range. — Nesting in the northern part of both hemispheres, almost cosmopolitan during migration.

38. ACTITIS MACULARIA (Linnæus).

Tringa macularia LINNÆUS, Syst. Nat., ed. xii, I, p. 249, 1766.
Tringoides macularia SHARPE, Cat. Birds Brit. Mus., XXIV, p. 468, 1896.

Range. — North America, migrating in winter to northern and central South America. Galapagos Archipelago.

This bird is a chance visitor at the Galapagos in winter. We have one specimen taken at Tagus Cove, Albemarle, in January. Other collectors have not reported it.

Genus **Numenius** Brisson.

Numenius BRISSON, Ornithologist, VI, p. 311, 1760.

Range. — Breeding in northern parts of northern hemisphere; cosmopolitan during migration. Galapagos Archipelago.

39. NUMENIUS HUDSONICUS Latham.

Numenius hudsonicus LATHAM, Ind. Orn., p. 712, 1790. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 633, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 189, 1899.
Numenius borealis SALVIN, Proc. Zool. Soc. Lond., p. 429, 1883.

Range. — Arctic and subarctic regions of North America during breeding season; during migration, central and South America. Galapagos Archipelago.

Not numerous at the Galapagos, but frequently seen during winter. We saw more individuals along the eastern shore of Narboro Island than anywhere else.

The specimen in the British Museum, collected by Markham at the Galapagos Islands, and recorded by Salvin as *Numenius borealis*, is said by Rothschild and Hartert to be *N. hudsonicus.*

Family CHARADRIIDÆ.

Genus **Squatarola** Cuvier.

Squatarola CUVIER, Règ. Anim., I, p. 467, 1817.

Range. — Arctic during breeding season, cosmopolitan during migrations. Galapagos Archipelago.

40. SQUATAROLA SQUATAROLA (Linnæus).

Tringa squatarola LINNÆUS, Syst. Nat., ed. x, I, p. 149, 1758.
Squatarola squatarola RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 626, 1896 (Galapagos).—ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 187, 1899 (Galapagos).

Range.—Same as that of the genus given above.

This species occurs at the Galapagos in both winter and summer. It was taken by Baur and Adams in August, by the Harris expedition in November, and by us in February. It is not of common occurrence. We have only one specimen; taken at Elizabeth Bay, Albemarle.

Genus Ægialitis Boie.

Ægialitis BOIE, Isis, p. 558, 1822.

Range. — Cosmopolitan. Galapagos Archipelago.

41. ÆGIALITIS SEMIPALMATA (Bonaparte).

Charadrius semipalmatus BONAPARTE, Journ. Acad. Nat. Sci. Phila., V, p. 98, 1825.
Ægialitis semipalmata RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 628, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 186, 1899.

Range. — Breeding in arctic and subarctic parts of North America, migrating in winter south to northern South America. Galapagos Archipelago.

This bird has been taken at the Galapagos Islands during both summer and winter. Rothschild and Hartert report it taken by the Harris expedition from July 29 to December 3. We have two specimens taken in January, one at Turtle Point near Tagus Cove, Albemarle, and the other on the east shore of Narboro. The birds were very wild and hard to approach — qualities that distinguish all the visitant birds of the archipelago from the resident birds.

Family APHRIZIDÆ.

Genus Arenaria Brisson.

Arenaria BRISSON, Ornithologist, V, p. 132, 1760.

Range. — Northern parts of northern hemisphere during the breeding season; coasts of the entire world during migration.

42. ARENARIA INTERPRES (Linnæus).

Tringa interpres LINNÆUS, Syst. Nat., ed. x, I, p. 148, 1758.
Arenaria interpres RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 625, 1896 (Galapagos). — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 187, 1899.

Range. — Same as that of the genus given above.

Common on the shores of most of the islands, and appears to be found at the archipelago throughout the year. The birds are very wild, however, and evidently not resident there. Taken by Baur and Adams in June and July, by the Harris expedition from September to November, and by us in January and March.

Family HÆMATOPODIDÆ.

Genus **Hæmatopus** Linnæus.

Hæmatopus Linnæus, Syst. Nat., ed. x, I, p. 152, 1758.

Range. — Nearly cosmopolitan. Galapagos Archipelago.

43. HÆMATOPUS GALAPAGENSIS Ridgway.

? Hæmatopus palliatus Sclater and Salvin, Proc. Zool. Soc. Lond., p. 323, 1870 (Galapagos).

Hæmatopus galapagensis Ridgway, Auk, III, p. 331, 1886 (Chatham Island, Galapagos); Proc. U. S. Nat. Mus., XIX, p. 621, 1896. — Rothschild and Hartert, Novit. Zool., VI, p. 186, 1899.

Range. — Galapagos Archipelago: Chatham, Hood, Barrington, Indefatigable, Seymour, James, Albemarle, Narboro, Bindloe and Tower.

These birds are not specially abundant anywhere but one sees them at nearly every place on the shores of the islands. We found them specially frequent in the small pools just back of the shore on the west side of the southern Seymour Island. They were always very tame.

Family COLUMBIDÆ.

Genus **Nesopelia** Sundevall.

Nesopelia Sundevall, Meth. Nat. Av. Disp. Tentam., p. 99, 1872.

Range. — Galapagos Archipelago.

Allied to *Zenaida* but differing from it in the possession of twelve instead of fourteen rectrices.

44. THE NESOPELIA GALAPAGOENSIS SERIES.

44*a*. NESOPELIA GALAPAGOENSIS GALAPAGOENSIS (Gould).

Zenaida galapagoensis Gould, Zool. Voy. Beagle, III, Birds, p. 115, pl. 46, 1841 (Galapagos Archipelago).

Nesopelia galapagoensis Ridgway, Proc. U. S. Nat. Mus., XIX, p. 614, 1896.

Nesopelia galapagoensis galapagoensis Rothschild and Hartert, Novit. Zool., VI, p. 183, 1899.

Range. — Charles, Hood, Chatham, Barrington, Indefatigable, Duncan, Jervis, James, Albemarle, Narboro, Abingdon, Bindloe and Tower.

This is a common bird on most of the islands of the archipelago, rare only on Charles and Albemarle. This may be due to the number of dogs and cats on these two islands, since the species nests on the ground. The birds seem to be more or less migratory, for during January and March we saw only one or two doves about Tagus Cove on Albemarle, while in June they were not infrequent here and at this time we often saw small flocks at Turtle Point just north of Tagus Cove.

One nest was found in April on James Island. It consisted of a few straws and leaves lining a cavity in the surface of a rough lava bed. The nest contained one egg; the female was collected and another egg was found in the oviduct nearly ready to be laid. The first one is dull white, oval, and measures 27.5 × 22.5. On Barrington the doves were found nesting during the latter part of May. The nests were all on the ground between blocks of lava, and contained each two eggs like the one from James.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesopelia galapagoensis galapagoensis*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.	Middle Toe.
3945	Narboro.	♂	238	123	67	16.3	13.3	24	21
3882	"	"	240	127	66	16.3	13.5	23	22
4412	"	"	245	129	76	16	14	23	22
4453	"	"	250	134	71	17	14	23.5	20.5
3889	"	♀	218	120	68	15	14	21.5	19
5023	Albemarle, Iguana Cove.	"	220	119	73	16	13	20	21
5252	" Tagus "	"	215	113	67	16.5	13.5	22.5	21
4466	James.	"	220	120	68	16	12.5	23	20
5172	Duncan.	"	225	118	67	15.5	12.5	21.5	20.5
4989	Barrington.	"	211	118	67	15	12	21	20
4898	Hood.	♂	247	134	78	17.5	13.5	22	24
5306	Tower.	"	244	130	78	17.7	14.3	23.7	22

44*b*. NESOPELIA GALAPAGOENSIS EXSUL Rothschild and Hartert.

Nesopelia galapagoensis exsul ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 184, 1896 (Culpepper and Wenman Islands).

Range. — Culpepper and Wenman.

This form is considerably larger than *N. g. galapagoensis*, having a larger body, longer wings, and a longer and heavier bill. The wing in the males in our collection is not less than one hundred and thirty

nine millimeters in length, and the culmen in the males is in all cases greater than eighteen millimeters. In the specimens of males from the other islands the wing does not exceed one hundred and thirty four millimeters and the culmen is in all cases less than eighteen millimeters. No differences of color are appreciable between the two subspecies. The difference between the males of the two forms is such that they might almost be given the rank of species. The females are more nearly alike, being in each case smaller than the males.

The subspecies was very common on Culpepper and Wenman. We have seven specimens taken in December.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesopelia galapagoensis exsul.*

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.	Middle Toe.
5312	Culpepper.	♂	260	139	79	19.5	15	26.5	23.5
5315	"	"	255	141	76	19	15	26.5	22
5316	"	"		144	82	19.5	16	26	23.7
5312	"	♀	230	125	66	16.7	14	23	21.3
5314	"	"	236	126	68	17	14	22.5	21
5317	"	"		128	72	17.5	14	23.3	21.7
3859	Wenman.	♂	248	140	79	18.5	15	24.5	22

Family FALCONIDÆ.

Genus **Buteo** Cuvier.

Buteo CUVIER, Leç. Anat. Comp., I, Tabl. II, Ois., 1800.

Range. — Cosmopolitan, excepting most of the Australian region. Galapagos Archipelago.

45. BUTEO GALAPAGOENSIS (Gould).

Polyborus galapagoensis GOULD, Proc. Zool. Soc. Lond., p. 9, 1837 (Galapagos Islands).

Craxirex galapagoensis GOULD, Zool. Voy. Beagle, III, Birds, p. 23, pl. 2, 1841.

Buteo galapagoensis RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 587, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 174, 1899.

Range. — Hood, Chatham, Barrington, Indefatigable, Duncan, Jervis, James, Albemarle, Narboro, Abingdon and Bindloe.

Closely allied to *Buteo swainsoni* of North America, from which it differs in the larger bill and feet.

Coloration of the Naked Parts in Life. — Iris seal-brown in the adult, ochreous-buff in the young; cere and base of mandible naples yellow; upper mandible bluish-brown at the base, blackish at the tip; feet and legs maize-yellow, claws blackish.

We have two adult specimens from Albemarle in the dark phase, and one immature specimen in the tawny phase. We observed the species frequently on Narboro, but we did not collect any specimens here. It was seen also on James, Duncan, Indefatigable, Barrington, Hood, Chatham, Abingdon and Bindloe. It is fairly common throughout its range but is most numerous along the coast, showing, however, no preference for any special kind of country. It is equally abundant on barren stretches of lava and on areas of dense vegetation. It is extremely tame and will usually come within a few feet of a collector and sometimes closer still if he has any food to offer. The birds feed principally on the common lizard, *Tropidurus*, which abounds on nearly all the islands near the shore. All the specimens examined contained remains of these lizards. The rarity of this lizard on Charles, where it is now nearly extinct, may explain the absence of *Buteo* from this island. Similarly, the islands of Tower, Wenman and Culpepper, where the buzzard is lacking are also without representatives of *Tropidurus*. Darwin says that the *Buteo* feeds on the young of the land tortoise, *Testudo*, when just emerging from the shell. If this is the case, it is probable that they likewise eat the young of the green sea turtle, *Chelone*, which breeds abundantly on the sand beaches.

A nest containing two incubated eggs was found on Bindloe in June. The nest was situated on a ledge of lava projecting from the perpendicular side of a canyon; it was a very bulky affair made of sticks and twigs and lined with leaves. Both of the parents were in the dark phase of plumage, which is probably the adult color. Only one of these eggs was preserved. It is immaculate greenish-white, about the same color as the eggs of *Circus hudsonius* (Linn.), and measures 58 × 44.

Another nest was found in January near Tagus Cove, Albemarle, situated on a high pinnacle of lava near the middle of a very rough lava stream. This nest was very large. The height being about three feet and the basal width nearly as great. It had evidently been used for many years. A pair of buzzards in dark plumage remained most of the time in the neighborhood and were presumably the owners. We never got any eggs from this nest, but the breeding season evidently does not begin until June.

MEASUREMENTS OF ADULT SPECIMENS OF *Buteo galapagoensis*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Tarsus.	Middle Toe.
3946	Albemarle, Point Christopher.	♂	535	405	223	40	70	48
3965	" " "	♀	575	430	252	41	71	55

Family STRIGIDÆ.

Genus **Strix** Linnæus.

Strix Linnæus, Syst. Nat., ed. x, I, p. 92, 1758.

Range. — Almost cosmopolitan. Galapagos Archipelago.

46. STRIX PUNCTATISSIMA Gray.

Strix punctatissima Gray, Zool. Voy. Beagle, III, Birds, p. 34, 1841 (James Island).—Ridgway, Proc. U. S. Nat. Mus., XIX, p. 583, 1896.—Rothschild and Hartert, Novit. Zool., VI, p. 175, 1899.

Range. — James, Indefatigable, South Seymour, Abingdon and Albemarle. (Records of this species from the mainland are doubtful.)

Two immature specimens are in the collection. They are only slightly fulvous below, being chiefly grayish, spotted with dark brownish. The wing in each is less than two hundred and thirty millimeters. One of the specimens is from near Tagus Cove, Albemarle, where it was secured in a cavity on the side of a steep walled canyon; the other was taken from a cavity between some rocks on Seymour Island.

Several old nesting burrows were seen on canyon sides near Tagus Cove, Albemarle, and in one an old unhatched egg was found. This egg is whitish and in shape is slightly more spherical than the eggs of *Strix pratincola* Bonap. It measures 41 × 31. The entrances to the burrows were strewn with the skulls and other remains of rats (*Mus*), the rodents apparently forming the greater part of the food of the owls.

Family BUBONIDÆ.

Genus **Asio** Brisson.

Asio Brisson, Ornithologist, I, p. 28, 1760.

Range. — Absent in most of the Australian region, otherwise cosmopolitan. Galapagos Archipelago.

47. ASIO GALAPAGOENSIS (Gould).

Brachyotus galapagoensis GOULD, Proc. Zool. Soc. Lond., p. 10, 1837 (Galapagos Islands).
Otus galapagoensis GOULD, Zool. Voy. Beagle, III, Birds, p. 32, pl. 3, 1841.
Asio galapagoensis RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 585, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 175, 1899.

Range. — Chatham, Hood, Barrington, Indefatigable, Duncan, James, Albemarle, Bindloe, Tower and Culpepper.

This species is a local form of the nearly cosmopolitan *Asio accipitrinus* (Pall.). It differs from the latter species in having a somewhat larger bill and conspicuously larger feet; the middle toe measuring about thirty two millimeters in length, while in *A. accipitrinus* it is about twenty seven millimeters. *A. galapagoensis* differs also in being generally darker and in having the brown streaks of the lower parts wider and persistent upon the posterior part of the abdomen, on the flanks, legs and under tail coverts.

This owl is more common on the Galapagos Archipelago than the only other species found there, *Strix punctatissima*. On some of the islands it is fairly abundant, especially on Duncan and Barrington. Throughout a part of its range this species must live entirely on birds and insects, for on Tower, Culpepper and Hood there are apparently no rodents. On Barrington and Duncan, where it is most numerous, mice and rats are abundant.

A set of four incubated eggs was taken on Barrington Island May 29. The nest consisted merely of a slight depression scraped in the scanty soil where it was found, to which no lining had been added. The eggs are white and subspherical in shape, measuring 42.5 × 34.5; 42.5 × 34; 43 × 34.5; 41 × 34.

MEASUREMENTS OF ADULT SPECIMENS OF *Asio galapagoensis*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Tarsus.	Middle Toe.
4976	Barrington.	♀	340	290	146	32	45	32
4716	Duncan.	"	375	280	155	32	43	31
	Asio accipitrinus.							
3181	Palo Alto, California.	♀		280	150	29	46	27
3157	Pullman, Washington.	♂		305	155	27	46	26
	Monomoy Island, Massachusetts.	"		310	155	30	46	27

Family CUCULIDÆ.

Genus **Coccyzus** Vieillot.

Coccyzus VIEILLOT, Analyse, p. 28, 1816.

Range. — Temperate and tropical America. Galapagos Archipelago.

48. COCCYZUS MELANOCORYPHUS Vieillot.

Coccyzus melanocoryphus VIEILLOT, Nouv. Dict. d'Hist. Nat., VIII, p. 271, 1817. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 581, 1896 (Charles and Chatham Islands). — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 174, 1899.

Range. — Most of South America. Galapagos Archipelago: Charles, Chatham and Albemarle.

We have one adult specimen taken in May on Chatham, where the species was fairly common. On Albemarle we found it at the base of the mountain back of Tagus Cove, where in March we secured three young birds. Their notes are very similar to those of *C. americanus*. We have also one adult from Iguana Cove, Albemarle.

MEASUREMENTS OF ADULT SPECIMENS OF *Coccyzus melanocoryphus*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.	Middle Toe.
4752	Chatham.	♂	270	115	134	26	17	25.5	19.5
4328	Albemarle, Iguana Cove.	"	286	112	148	29.5	19	26	17

Family TYRANNIDÆ.

Genus **Myiarchus** Cabanis.

Myiarchus CABANIS, Arch. f. Naturg., p. 272, 1844.

Range. — All of America except arctic and antarctic regions. Galapagos Archipelago.

Subgenus **Eribates** Ridgway.

Eribates RIDGWAY, Proc. U. S. Nat. Mus., XVI, p. 606, 1893. (Type, *Myiobius magnirostris* Gray.)

Range. — Galapagos Archipelago. Represented by one species. "Tarsus as long as the bill from the rictus; lateral outlines of the bill not contracted terminally. Otherwise similar to the subgenus *Onychopterus*" (Ridgway, *Proc. U. S. Nat. Mus.*, XIX, 1896, p. 568).

49. MYIARCHUS MAGNIROSTRIS (Gray).

Myiobius magnirostris GRAY, Zool. Voy. Beagle, III, Birds, p. 48, 1841 (Chatham Island).

Myiarchus magnirostris RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 569, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 171, 1899.

Range. — Chatham, Charles, Hood, Barrington, Indefatigable, Duncan, Jervis, James, Albemarle, Narboro, Abingdon and Bindloe. (Absent on only Wenman, Culpepper and Tower.)

Our specimens are from Narboro, Albemarle, James, Abingdon, Bindloe, Hood and Chatham. No local variations have ever been discovered in this species; it is one of the few peculiar land birds which are the same on all the islands within its range.

We found the species rather common wherever it occurred, but it was probably more abundant at Iguana Cove, Albemarle, than at any other locality. The notes they generally uttered consisted of a liquid-sounding *whĭt-whĭt*, sometimes varying to *whĭt-weé*, the note so common to all small flycatchers. The nidification and eggs are unknown.

MEASUREMENTS OF ADULT SPECIMENS OF *Myiarchus magnirostris*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Width of Bill at Base.	Maxilla from Nostril.	Tarsus.
4418	Narboro.	♂	167	73	69	16.3	7	11.5	21
4414	"	♀		68	66	15	7	10.5	21
4079	Albemarle, Iguana Cove.	♂	150	72	65	16.5	6.5	12	21.5
4089	" " "	"	157	71	66	17	6	11.7	21.5
4073	" " "	♀	154	70	66	15	6.5	11.5	21
4054	" " "	"	155	66	60	15	7	11	22
4027	" " "	"	152	65	63	16	7	11	21
4070	" " "	"	157	69	65	15	6.7	10.7	22.5
3924	" Tagus "	♂	150	70	61	16	6.3	11.3	21
4251	" " "	♀	165	71	65	15	7	11	20
5276	Abingdon.	♂	163	71	67	16.5	6.3	12	21.5
4720	Bindloe.	"	158	69	65	16	7	12	22
4812	Hood.	"	164	72	67	16	7	12	21
4493	James.	"	160	73	69	16	6.7	11.5	21.5
4533	"	♀	159	69	64	15.5	7.5	11.3	21.5

Genus **Pyrocephalus** Gould.

Pyrocephalus GOULD, Zool. Voy. Beagle, III, Birds, p. 44, 1841.

Range. — Tropical and subtropical America, except the West Indies. Galapagos Islands.

50. THE PYROCEPHALUS NANUS SERIES.

50*a*. PYROCEPHALUS NANUS NANUS (Gould).

Pyrocephalus nanus GOULD, Zool. Beagle, III, Birds, p. 45, pl. 7, 1841 (Galapagos Islands).—RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 572, 1896 (James Island).—ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 172, 1899.

Pyrocephalus intercedens RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 366, 1894 (Indefatigable Island), and XIX, p. 575, 1896 (Indefatigable and Albemarle Islands).

Pyrocephalus carolensis RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 365, 1894 (Charles Island).

Range. — Charles, Indefatigable, Duncan, Jervis, James, Albemarle and Narboro.

We have seven adult males from Albemarle taken at Tagus Cove, Elizabeth Bay and Iguana Cove in January, February and March, three from the east and north sides of Narboro in January and April; two from James in April; and one from Duncan in May. These males present no perceptible differences, being all dark blackish-brown on the back, dark vermilion on top of the head and bright, lighter vermilion below. The collection contains also a small number of females from these same islands and from Charles, but they vary so much in color that slight specific differences could not certainly be

MEASUREMENTS OF ADULT SPECIMENS OF *Pyrocephalus nanus nanus*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Width of Bill at Base.	Maxilla from Nostril.	Tarsus.
5045	Albemarle, Tagus Cove.	♂	137	62	51	13.5	6	9	17
5153	" " "	"	135	64			6		18.7
3940	" " "	"	137	63	51	13.7	7	10	19.5
4123	" " "	"	128	64	54	14	7	9.7	18.3
4267	" " "	♀	132	61	51	12.5	6.5	9	17
4062	" " "	"	123	61	52	12.5	6	8.5	18
3947	" " "	"	130	62	53	13		9	18.7
4223	Albemarle, Elizabeth Bay.	♂	133	66	53	14	7	9	18.5
4292	" " "	"	138	66	54	13	7	10	18
4299	" " "	"	140	65	55	13.5	6	9	18.5
4417	Narboro.	"	136	62	54	13	5.7	9	18.5
3879	"	"	128	64	52	12	5.5	9	18
3886	"	"	136	64	52	13.5	6	9.5	18
	"	♀	135	64	50	13	6.5	9.5	18
4531	James.	♂	135	64	53	13	5.5	8.5	19
4530	"	"	132	62	51	13	6	10	18.5
4553	"	♀	130	62	51	12.7	6	8.5	19
4625	Duncan.	♂	135	62	52	13.5	6	9	19

based on them. Hence we must agree with Rothschild and Hartert in placing the individuals from Charles, Indefatigable, Duncan, James, Albemarle and Narboro together in one species, including thus under *P. nanus nanus* three of Ridgway's species. The specimens from Abingdon and Bindloe may perhaps be regarded as a separate subspecies.

This species is nowhere very common, but occurs almost everywhere. The mangrove swamps of Albemarle and Narboro are a favorite haunt of this bird, but we found it pretty generally distributed from sea level to the tops of the highest mountains.

50*b*. PYROCEPHALUS NANUS ABINGDONI (Ridgway).

Pyrocephalus abingdoni RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 367, 1894 (Abingdon Island), and XIX, p. 578, 1896 (? Bindloe Island and Abingdon Island).

Pyrocephalus nanus ROTHSCHILD AND HARTERT (in part), Novit. Zool., VI, p. 172, 1899.

Range. — Abingdon and Bindloe.

This form may very doubtfully be retained as different from the last. Our specimens were all taken in June, while those of *P. nanus nanus* were taken from January to May. The Abingdon and Bindloe adult males, of which we have only three, differ from those of *P. n. nanus* in having a distinct orange shade to the vermilion of the under parts, the color being rather conspicuously different from that of the average males of *P. n. nanus*, but from some of the latter it is scarcely distinguishable. This color is called by Ridgway "flame scarlet or orange chrome," but we can scarcely recognize any such difference as this.

MEASUREMENTS OF ADULT SPECIMENS OF *Pyrocephalus nanus abingdoni*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
5008	Abingdon.	♂	137	63	55				19
5071	"	"	141	65	56		5.5		18.5
5047	Bindloe.	"	138	66	54		5.7		18

51. PYROCEPHALUS DUBIUS Gould.

Pyrocephalus dubius GOULD, Voy. Beagle, III, Birds, p. 46, 1841 (Galapagos Islands). — RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 368, 1894 (Chatham Island), and XIX, p. 579, 1896.— ROTHSCHILD AND HARTERT, Novit. Zool., VII, p. 173, 1899.

Pyrocephalus minimus RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 113, 1890, in text (Chatham Island).

Range. — Chatham Island.

This species differs from *P. nanus* in having a shorter wing, the wing not exceeding fifty nine millimeters in length and averaging about fifty seven millimeters, while in *P. nanus* the wing varies from sixty one to sixty six millimeters averaging about sixty three. We have four adult males: two of them are decidedly orange-red below, much more so than in *P. nanus abingdoni;* one of the others has less of an orange shade, while the fourth is indistinguishable in color from ordinary males of *P. nanus.*

We found this species fairly common on Chatham in May, where we took four adult males and two adult females. They were perhaps more plentiful in the upper cultivated parts of the island than elsewhere.

MEASUREMENTS OF ADULT SPECIMENS OF *Pyrocephalus dubius.*

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Width of Bill at Base.	Maxilla from Nostril.	Tarsus
4756	Chatham.	♂	132	58	49	12.5	5.5	8.3	16.5
5748	"	"	128	57	49	11	6.5	8	16.3
5743	"	"	129	58	46	11.7	5.5	8	16.5
4875	"	"	134	59	52	13	5.5	8.5	16
4834	"	♀	131	55	49	12	5	9	17
4807	"	"	129	56	48	11.5	6	8.5	17.5
5753	"	"	129	57	49	11	6	8.5	17.5

Family ICTERIDÆ.

Genus **Dolichonyx** Swainson.

Dolichonyx SWAINSON, Phil. Mag., I, p. 435, 1827.

Range. — Eastern North America, in winter south to South America. Galapagos Archipelago.

52. DOLICHONYX ORYZIVORUS (Linnæus).

Fringilla orizivora LINNÆUS, Syst. Nat., ed. x, p. 179, 1758.

Dolichonyx oryzivorus DARWIN, Zool. Beagle, III, Birds, p. 106, 1841 (James Island). — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 171, 1899 (Charles and Chatham Islands).

Range. — Same as that of the genus given above. On the Galapagos Archipelago: James, Charles and Chatham.

We did not meet with this species. It is recorded simply as a winter visitor, but five hundred and fifty miles of ocean is a long distance for it to traverse accidentally.

Family FRINGILLIDÆ.

Genus Geospiza Gould.

Geospiza GOULD, Proc. Zool. Soc. Lond., p. 5, 1837.
Cactornis GOULD, ibid., p. 6.
Camarhynchus GOULD, ibid., p. 6.
Platyspiza RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 545, 1896.
Cactospiza RIDGWAY, ibid., p. 546.

Range. — Peculiar to the Galapagos Archipelago and found on all of the islands.

We follow Rothschild and Hartert in combining all the Fringillid species of the Galapagos into one genus, *Geospiza*. It appears certain that they have all been derived from one form, and it is a matter of convenience more than anything else to give them all one name. Authors have heretofore disregarded the color in relating the species to one another, and have established different groups on the shape of the bill alone. The lines thus drawn have been found to break down, but, as we shall show, four well separated groups can be recognized on a color basis. These groups are nearly coincident with those that have been established on the different shapes of the bill, and the *types* of the latter each fall into one of the groups as based on the color, so that the same names may be retained. These groups are: *Cactospiza*, *Camarhynchus*, *Geospiza* and *Cactornis*. We include them under the genus *Geospiza* as subgenera, but this is making simply an arbitrary difference of degree between genera and subgenera.

The members of the genus as a whole present, in the young and adults, six different phases of plumage. Since these phases occur at definite periods in the growth of the individual birds they may be described as *stages*. The following are brief descriptions of these stages, which, throughout the discussion of *Geospiza*, we represent by the Roman numerals I to VI. Stage I is described in detail under *G. pallida*, and Stages II–VI under *G. fuliginosa parvula*.

Stage I. — General color yellowish-olive, darker above, pale below; wings dusky, the feathers widely edged with olive; middle and greater wing coverts with yellowish rufous edgings. Bill yellowish, darker above.

This stage is characteristic of the young in the first plumage of the subgenera *Cactospiza* and *Camarhynchus*.

Stage II. — Plumage brownish, paler below, feathers with darker centers showing specially as spots on the breast. Two wide, conspicuous rufous wing bands formed on the tips of the middle and greater wing coverts. Bill either entirely yellowish or yellowish below and brownish or dusky above. Plumage soft and lax.

Characteristic of the young in the second plumage of *Cactospiza* and *Camarhynchus*, and of the young in the first plumage of *Geospiza*.

Stage III. — Resembles Stage II in color, but differs in lacking the rufous wing bands, the tips of the wing coverts are gray or brownish-gray. Plumage compact, not soft and lax. Bill as in Stage II or entirely dusky.

Characteristic of the adult male and female of *Cactospiza*, of the adult female and the young in the third plumage of *Camarhynchus*, and of the adult female and young in the second plumage of *Geospiza*.

Stage IV. — Dark brown above, spotted with blackish-brown below, edges of feathers of breast and abdomen whitish. Bill mostly brownish or black.

Characteristic of immature males in the fourth plumage of *Camarhynchus* and the third of *Geospiza*, and of adult females and young in the first plumage of the lower numbers of *Cactornis*.

Stage V. — Back, head, throat and breast continuously black; wings sooty-brown; abdomen whitish. Bill black.

Characteristic of adult males of *Camarhynchus*, of immature males in the fourth plumage of *Geospiza*, and of adult females and young of the higher members of *Cactornis*.

Stage VI. — Entirely brownish-black or black, except the edges of the under tail coverts which are whitish, buffy or chestnut. Bill black.

Characteristic of adult males of *Geospiza* and *Cactornis*.

From the above description it may be seen that the four subgenera mentioned differ from one another in a very significant manner. The differences may be tabulated as follows:

A. Adult females in Stage III.
   1. Adult males in Stage III..... *Cactospiza*.
   2. Adult males in Stage V ..... *Camarhynchus*.
   3. Adult males in Stage VI..... *Geospiza*.

B. Adult females in Stages IV or V..... *Cactornis*.

It will be seen from the above that there is in the genus a regular progression toward complete melanism, *i. e.*, toward a form in which both sexes and all ages of the young would be entirely black. Hence, it appears to us that the color may be taken as the most important factor in the evolution of the genus. Almost the only other variable character is the beak. Hence, by plotting with the color variation as the ordinate and the bill variation as the abscissa, we can arrive at an approximate scheme of the relationships of the different subgenera, species and subspecies of the genus. The diagram on page 276 is formed in this way. This diagram is made out from the characters of the males only, except in the upper or *Cactornis* half of Stage VI, for in all the others the females remain in Stage III.

The diagram shows that the young of *Cactospiza* during their growth pass through Stages I and II while the adults never get beyond Stage III. The young males of *Camarhynchus* traverse Stages I, II, III and IV, arriving by maturity at Stage V. This is their ultimate condition. The males and females of *Geospiza* begin at Stage II and the male goes through all the stages up to Stage VI, which represents the maximum of blackness attained by any of the *Geospizæ*. The males of *Cactornis* are the same when adult as the males of *Geospiza*, but both males and females in their growth begin at Stage IV (or go very rapidly through Stages II and III). The female in this group reaches Stage V, or a condition similar to it. Hence, the average amount of blackness in the subgenus *Cactornis*, considering all the forms, is greater than in *Geospiza*, and for this reason we place it higher in the diagram. This scheme brings *G. conirostris conirostris* at the top of the entire *Geospiza* series. The position of the species in the diagram to the right or to the left of the main vertical line, indicates the relative slenderness or thickness respectively of the bills.

The position of the species as given in the diagram certainly represents their degrees of resemblance, but *we do not claim that it certainly represents their natural relationships.* We have no way of determining to what extent *convergent evolution* has operated in causing forms to resemble one another. However, in the discussion of the species and subspecies we have followed the order indicated in the diagram, working in each direction away from the main vertical line.

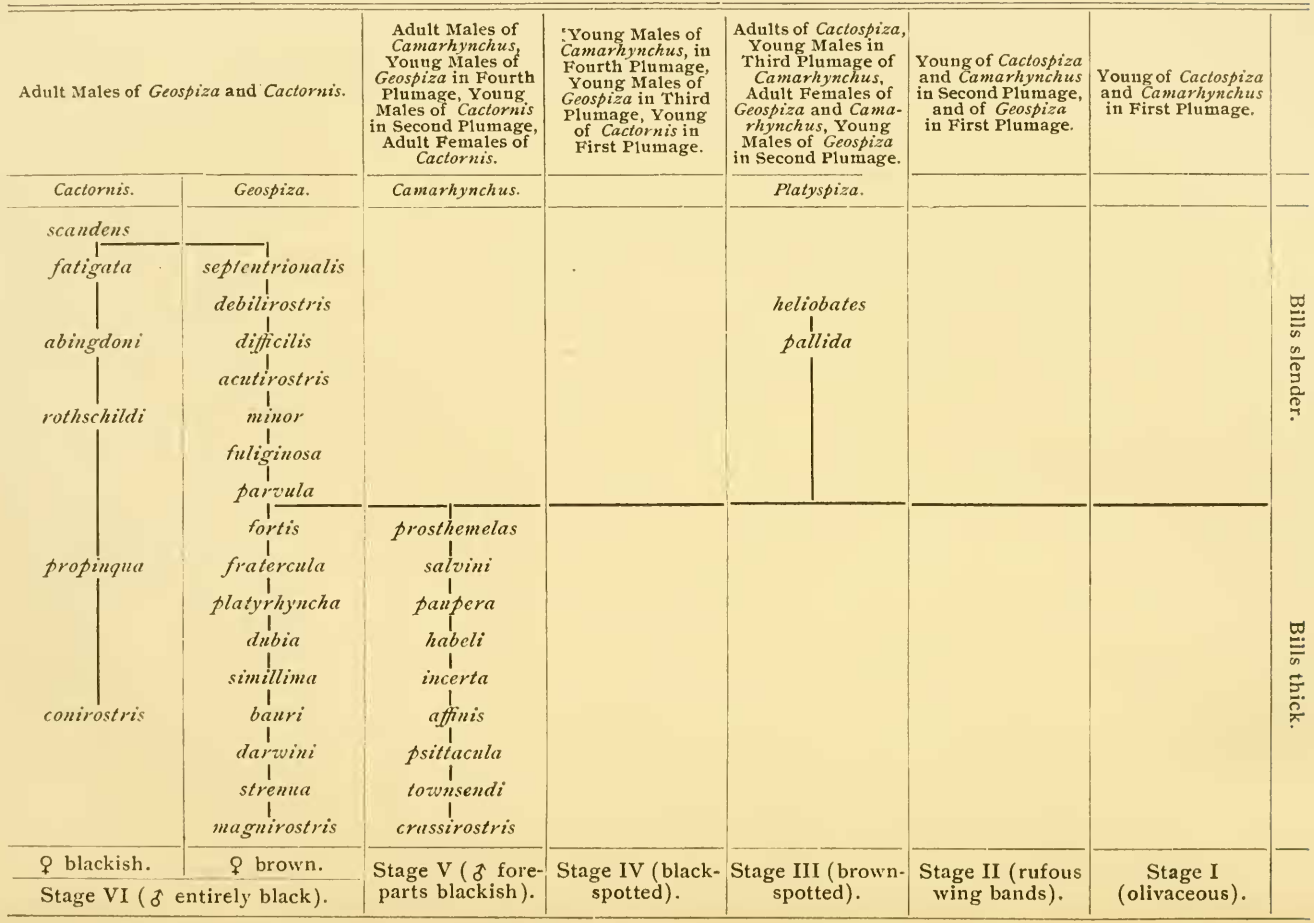
Subgenus **Cactospiza** Ridgway.

Cactospiza Ridgway, Proc. U. S. Nat. Mus., xix, p. 546, 1896 (Type, *Cactornis pallida* Sclater and Salvin).

No black on the plumage at any stage. Sexes similar, and the young resemble the adults. Color, above brown with dusky centers

Diagram of Relationships of Species and Subspecies of Geospiza.

Vertical distances represent differences in color; horizontal distances represent variations in size of the bill.



to the feathers, below buffy-white spotted with brown on the breast and on the sides. Bill slender; culmen curved, not greater than eighteen millimeters, contained one and one third times in the tarsus; depth of bill about equal to gonys.

The two species at present known under this subgenus without doubt stand nearer to the ancestral *Geospiza* than does any other known member of the genus. The plumage of the male and the female is the same and is identical with that of young birds of *Camarhynchus* and *Geospiza* proper before they have begun to assume the melanistic phase characteristic of all the higher *Geospizæ*. Young birds of this subgenus, in the first plumage, have a bright olivaceous color, a character common to young birds of *Cactospiza* and *Camarhynchus* but lost by all the members of *Geospiza* proper and of *Cactornis*. The adults reach the brown-spotted stage attained by the young of the other higher groups in Stage III. Hence, during their life history, the members of *Cactospiza* go through Stages I, II and III.

One member of the subgenus, *G. heliobates*, is an inhabitant exclusively of the mangrove swamps of the archipelago. It might be fancifully supposed that these mangrove swamps were the first vegetation on the islands and that *G. heliobates*, or an ancestor of the present *Geospizæ* resembling it, lived in these swamps until the islands became elsewhere fit for habitation; that then some of the birds left the swamps and became differentiated into the species of *Camarhynchus*, *Geospiza* proper, and *Cactornis;* while the others, remaining in the swamps, retained their primitive plumage, and survive at present as *G. heliobates*. The mangrove swamps were, most probably, the first vegetation of the islands on which they occur, but they are not present to any extent anywhere except on the southeast part of Albemarle, along the shores of the straits between Albemarle and Narboro, and at Elizabeth Bay, Albemarle. These islands do not by any means appear to be the oldest of the archipelago and their mangrove swamps stand on very recent lava. Hence the greater probability is that *G. heliobates* has been derived from *G. pallida*, the member of *Cactospiza* that inhabits the same areas as the other *Geospizæ*. The two species differ only in the size of the bill.

53. GEOSPIZA PALLIDA (Sclater and Salvin).

Cactornis pallida SCLATER AND SALVIN, Proc. Zool. Soc. Lond., p. 323, 1870 (Indefatigable Island).

Cactornis hypoleuca RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 109, 1890 (James Island).

Camarhynchus pallidus RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 565, 1896; Bull. U. S. Nat. Mus., 50, Pt. 1, p. 487, 1901.

Camarhynchus productus RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 364, 1894 (Albemarle Island); Proc. U. S. Nat. Mus., XIX, p. 566, 1896.
Geospiza pallida ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 165, 1899 (Indefatigable, Jervis, Duncan, James and Albemarle Islands).

Range. — Indefatigable, Jervis, Duncan, James and Albemarle.

Adult Male. — Cat. No. 4591, Leland Stanford Junior University Museum; James Island, April 22, 1899. Above, plain light brown, darker on the head where the feathers have distinctly dark brown centers; lighter, almost grayish-brown on the rump and upper tail coverts. Upper surface of wings and tail darker than the back, somewhat sooty-brown. The wing quills with narrow grayish outer edgings, and wider slaty inner borders. The upper wing coverts with indistinct grayish-brown edgings. Under wing coverts whitish. Lores, superciliary line, subocular and auricular regions, and entire under parts dirty buff gray, palest on the belly and under tail coverts. Under parts most strongly tinged with brownish-buff on the breast and along the sides. Throat and breast spotted with dusky. Bill black. Feet dark brown. Length 148 millimeters, wing 75, tail 48, culmen 17.5, gonys 9.3, width of bill at base 7.3, depth of bill at base 9.5, tarsus 24.

Immature. — Cat. No. 5225 Leland Stanford Junior University Museum; Iguana Cove, Albemarle, June 9, 1899. Back almost entirely pure yellowish-olive, the feathers of the head having slightly dusky central areas. The lower parts are bright yellowish-buff, considerably paler than the back. Wings and tail dusky with wide olive-buff edgings to the feathers. The feathers of the breast and sides without subterminal brown spots. Bill brownish-yellow above, pale yellowish below. Feet dark brown (specimen moulting). This plumage is what we have termed Stage I in the evolution of the color of the *Geospizæ*.

The color of the specimen just described is identical with that of young birds of the subgenus *Camarhynchus*. It was taken at about one thousand feet elevation at the south end of Albemarle, near Iguana Cove.

This species probably represents the ancestral *Geospiza* more nearly than any other species of *Geospiza* now living. In plumage it is certainly primitive, for in the adult it reaches only the stage attained by the immature birds of all the other species. Whether the bill has the shape of the ancestral *Geospiza* or not is impossible to say, since the variation of this member in the genus is so great that we can place no reliance on the supposition that it has remained constant.

Geospiza pallida differs but little from the next species, *G. heliobates*

of the mangrove swamps of Albemarle and Narboro. The songs of the two species are, however, very different. That of *G. pallida*, as we heard it on James, may be represented thus: *chĭr-kēē ē-ē-ē chĭr-kēē ē-ē-ē*. It is a rare bird, the two specimens above described are the only ones we obtained.

54. GEOSPIZA HELIOBATES Snodgrass and Heller.

Geospiza heliobates Snodgrass and Heller, The Condor, p. 96, Aug., 1901 (Albemarle Island).

Range. — Albemarle and Narboro in mangrove swamps.

Specific Characters. — Very similar to *G. pallida*, resembling it in coloration, but having a smaller bill — the culmen being 15.5 millimeters or less in length, while in *G. pallida* it is 17 millimeters or more in length.

Adult Male. — Cat. No. 4186 (*type* of the species), Leland Stanford Junior University Museum; mangrove swamp at Tagus Cove, Albemarle Island, Jan. 24, 1899. Above dark brown with an olive tinge on the rump; all of the feathers of the dorsum with narrow pale olive-grayish edgings; wing and tail feathers lighter, more smoky-brown; lores, sides of head and under parts dirty buff-gray; brownish-buff on the sides and flanks; lores spotted with brown; feathers of the breast and sides with dark brown central areas forming spots of the same color. Tips of the greater and the middle wing coverts rather indistinctly brownish-rufous, forming two inconspicuous cross bands. Under wing coverts grayish; under tail coverts brownish-buff with pale grayish edgings. Under surface of wing and tail feathers grayish-brown. Bill black. Feet dark brown. Length 123 millimeters, wing 72, tail 48.5, culmen 15, gonys 8, width of bill at base 6.5, depth of bill at base 9, tarsus 21.5.

There is a slight variation in the paleness of the under parts in different specimens of adult males, some being slightly paler than the *type*. Some also have a slightly more olive tinge to the plumage of the back. There is present in a few specimens a very distinct gray superciliary stripe ending behind the eye above the auricular region; in others this stripe is less distinctly marked or entirely absent. There is no distinguishing difference between the Albemarle and Narboro specimens.

Adult Female. — Female specimens having the plumage very much worn are almost identical in coloration with the males, but generally have fewer and smaller spots below. Above, the plumage is blackish on the head, almost pure olive-brown on the back, with the central

areas of the feathers darker. Wing and tail feathers dark brown with olive-buffy edgings.

There is considerable variation in the color of the adult females. Some are, as described above, almost exactly the same as the males, but others have the lower parts plain buff-gray with no spots whatever.

Immature Males and Females. — Feathers of the head and back with blackish centers and olive-yellowish borders, on the head the black predominates, on the rump the olive-yellow, on the back the two are present in almost equal proportions. Wing and tail dark brown with buff edgings to the feathers; these edgings are widest and most conspicuous on the tips of the greater and middle wing coverts. Under parts similar to the adult male, having the same spots, but generally paler. Bill dusky or brownish above, pale brown or yellow below. Feet dark brown.

Still younger birds (represented only by males in our collection) are colored like the last but have no spots on the under surface, being plain dirty grayish below with a buff tinge, especially on the breast and along the sides.

We have no females of this stage but it is to be supposed from analogy that they do not differ from the males.

The extent of the olive coloring on the upper parts varies according to the abrasion of the plumage. We have no specimens of this species in the purely olive and yellow plumage characteristic of Stage I, but since this plumage is well represented by *G. pallida* we may expect to find it present in *G. heliobates*.

Rothschild and Hartert[1] make the following remark concerning *Geospiza pallida:* "The birds which are olive and buffish yellow below are immature ones, but it is somewhat puzzling to account for the distinct blackish brown stripes on the lower throat, chest and sides of the body in some of them. Neither the apparently most adult ones, nor the most yellowish, and therefore, according to our view, youngest of the series, have these stripes well developed." The facts of the case are as follows (applicable to either species of the subgenus): (1) The youngest birds of each sex are unspotted below; (2) older immature birds of both sexes have the lower parts profusely spotted, in some cases even more so than in the adults; (3) adult males are generally more or less spotted below; (4) adult females may be spotted below or they may be entirely plain there. The apparent incongruity pointed out by Rothschild and Hartert of some of the females losing their spots in maturity may be explained as follows: The indi-

[1] Novitates Zoölogicæ, VI, p. 166, 1899.

vidual feathers of the spotted regions of both immature and adult birds are pale slaty-gray basally; toward the tip is an arrow head shaped spot of dark brown with the apex directed toward the distal part of the feather; beyond this and forming the exposed margin of the feather is a buffy-gray area. The youngest birds, represented by the olive and yellow specimens of *G. pallida* have no brown spots on the feathers of the lower parts. Our specimen is moulting. Hence, *the spotted plumage is obtained by a moult involving a change in the color of the feathers.* The individual feathers of the adults that are plain below and of those that are spotted below are the same in color, but those that are unspotted are new, and show no signs of being worn, while those of the spotted birds are so greatly worn that nearly all the pale marginal part has been lost. Hence this difference in the general coloration of the birds is not one of an actual difference in the color of the feathers, but is a difference of the degree of abrasion of the plumage.

The immature spotted birds have the plumage very soft and lax, and the tips of all the feathers are rough and ragged as if much worn away. We have no specimens of this age having a fresh plumage, but it is evident that if the feathers of the worn birds were entire the brown spots below would be concealed, and then immature birds would present the same two phases as do the adults. All of our immature spotted birds are moulting so that between this stage and the adults a moult intervenes.

Hence there is in *Geospiza pallida* and *G. heliobates* no real color difference between the males and the females. Immature birds in the second plumage, *i. e.*, in Stage II, differ from the adults only in having the bill paler in coloration — brownish above and yellow below; in the plumage being softer and more lax, and in possessing wider, more distinct and more buffy wing bands formed of the pale edgings of the middle and greater coverts. This latter character distinguishes birds of this stage in all the subgenera and may be regarded, when combined with a non-olivaceous plumage, as diagnostic of Stage II. Hence between Stage II and the adults a moult intervenes, *but this moult involves only a slight change in the color of the plumage.*

In its habits *Geospiza heliobates* is the most interesting species of all the *Geospizæ*. It inhabits exclusively the mangrove swamps and feeds on insects. Whether it occurs on other islands besides Albemarle and Narboro we do not know. These swamps in many places consist merely of a narrow fringe of trees bordering shallow lagoons that run inward from the shore; but in other places, such as at Turtle

Point, Elizabeth Bay and Villa Mil, Albemarle, and along the east shore of Narboro, depressions of the surface of considerable extent lie a short distance back from the shore and these fill up with water at high tide, but have generally no visible connection with the ocean. At such places there occur large, dense groves of the mangrove tree and of another tree, *Avicennia*, which is always associated with it. At high tide the bases of these trees are covered several feet in depth, while at low tide the floor of the swamp is generally exposed except for scattered pools of water. It is only in the denser, interior parts of such groves as these that *Geospiza heliobates* is found. The birds seldom come out to the edge of the swamp, but they may easily be taken if one can find a clear space near the center of the grove. They are not timid or wary, but seem simply to prefer the denser and more shaded parts of the swamps. Their food consists entirely of insects which they obtain under the bark of the trees.

The notes of this species are as distinctive of it as is its habitat. We first heard the birds in January in the grove at Turtle Point, just north of Tagus Cove, on Albemarle. The song resembled *tür-tür*, *tür-tür*, *tür-tür*, the set of two syllables being generally repeated three times in succession, although sometimes more and sometimes only twice. The sound was varied somewhat and often resembled *twër-twër*, *twër-twër*. The notes are uttered rather loudly and have a very striking sound when heard issuing from the depths of a dense and apparently otherwise uninhabited grove. The birds seem to utter the notes almost constantly, and their presence and location in a swamp may always be known by their song.

We observed the species in the swamps of the east shore of Narboro during January, March and April, and did not perceive any difference between the habits or notes of the birds here and those at Turtle Point, Albemarle. The species was also observed in two large groves situated two or three miles apart, on the north shore of southern Albemarle, a few miles west of Elizabeth Bay. It was at once apparent, however, on listening to the birds of these swamps that their song differed from that of the Tagus Cove and Narboro birds. Instead of each set of notes in the song consisting of *two* syllables, it consisted of *three*. Each trisyllabic set was repeated two or three times just as with the others. The song, hence, resembled *tür-tür-tür*, *tür-tür-tür*, *tür-tür-tür*. Each swamp was visited twice; the birds were not scarce in either, and only now and then were bisyllabic sets heard. We visited the Turtle Point swamp again in March and the birds here were singing, as before, their bisyllabic song.

Besides the song just described the species has several ordinary notes. One resembles *cheek*, the *k* sound at the end distinguishing it from the notes of other *Geospizæ*. The vowel sound of this may be varied to *chŏŏk*, but the terminal *k* is retained. When hopping about they also utter a very low sound resembling *cheep*. Another common note very characteristic of the species, and one by which it may readily be known, is a rather harsh, prolonged sound, having *ĕ* as the vowel and the stress declining toward the end.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza heliobates*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Width of Bill at Base.	Depth of Bill at Base.	Maxilla from Nostril.	Tarsus.
4491	Narboro.	♂	137	69.5	44.5	15.5	8.5	7	9.25	11	21.5
4492	"	"	132	73.5	46	15.5	8.25	7.5	8.5	10.5	21
3896	"	"	128	72	47	15	8	7	8	10	23
4109	"	"	127	71	49	15	8	7	9	10.5	22
4479	"	♀	130	70.5	40.5	15	8.3	7	9.5	10	21.5
4496	"	"	157	71	40.5	15.5	8	7	8.5	10.5	20.5
3911	"	"	133	73	53	15.3	8	7	9	11	23
4186	Albemarle.	♂	123	72	48.5	15	8	6.5	9	10.3	21.5
4161	"	"	126	70	48.5	15	8	7	8	11	21.5
4226	"	"	133	71.5	45	15.5	8.5	6.5	8	10.5	23.5
4266	"	"	127	69	39	15	8	6.5	8	10.5	21.5
4166	"	"	122	71	42	15	7.5	6.7	8.3	10	21.5
4124	"	"	128	72	43	15	8	6.5	8.7	10	21.5
4122	"	"	125	73	43	15	7.7	7	9	10	22
4130	"	"	129	74	45.5	15	7.7	7	8.5	9.5	22.3
4173	"	"	128	73	50	15	8	6.7	8.3	10	23
5142	"	♀	137	67.5	46	15.5	8	7	8	10.5	20
4249	"	"	132	69.5	42.5	15.3	7.5	6.7	8	10	22
4157	"	"	138	71	44	15	9	7	9	11.5	22.5
4177	"	"	112	70	42	14.5	8	6.7	7.7	10	21
4213	"	"	142	70	42.5	15	8.7	6.7	8	11	21.7
4242	"	"	136	68	41.5	15	8.5	6	7.5	10	21
4138	"	"	120	70	45	14	8	7	8.7	10	22
4135	"	"	125	69	46	15.3	8	7	9	10.5	21.5
4192	"	"	122	68	44	15	7.7	6.5	8	9.7	22
4146	"	"	123	69	51.5	15	8	7	8.7	10.3	22

We know nothing concerning the breeding habits of the species. The nesting season apparently does not begin till after March. It is still to be determined, also, whether the bird occurs in the mangrove swamps of other islands such as Indefatigable.

There are in the collection seven adult males, seven adult females, five immature males and one immature female from the mangrove swamp at Turtle Point north of Tagus Cove, Albemarle, taken in January; two adult males, two adult females and one immature male

from the swamps at Elizabeth Bay, Albemarle, taken in February; four adult males, two adult females, one immature male and five immature females from the mangrove swamps on the east shore of Narboro Island, taken in January, March and April; and one adult female from Tagus Cove, Albemarle, taken in June.

We have examined also specimens of this species in a collection belonging to Captain W. Johnson, of San Francisco, collected in 1900 and 1901 by Mr. G. M. Green, of San Francisco. The specimens are from the mangrove swamps at Tagus Cove, Albemarle, and also from the mangrove swamps on the southeast part of Albemarle, abreast of the Crossman Islands. They are exactly the same as our birds from Tagus Cove, Elizabeth Bay and Narboro. Mr. Green obtained one specimen of *Geospiza pallida* from the eastern side of the mountain south of Perry Isthmus.

In the preceding table No. 4186 was taken mated with No. 4138.

Subgenus **Camarhynchus** Gould.

Camarhynchus GOULD, Proc. Zool. Soc. Lond., p. 6, 1837. (Type *Camarhynchus psittacula* Gould.)

Adult males with the back, head, throat and breast blackish. Sexes dissimilar. Female never blackish. The young resemble the adult female. Bill conical with the culmen strongly curved.

The males of this subgenus go through Stages I to V. This is an advance of two stages beyond the stage attained by the males of the last subgenus. The female remains in Stage III. Birds in Stages I and II have the bill yellowish. In the higher stages the bill is generally black.

There is but slight variation in the shape of the bill. The species can be most naturally arranged in a series graded by the size of the bill, beginning with the smallest billed form and ending with the largest. Among the specimens there is considerable variation in color, but it is probable that the males of all the species eventually attain the stage in which the entire upper and fore parts are blackish, although such forms have not been reported for all the species. But many are rare and black males are unknown only in the rarer species.

55. THE GEOSPIZA PROSTHEMELAS SERIES.

55*a*. GEOSPIZA PROSTHEMELAS PROSTHEMELAS (Sclater and Salvin).

Camarhynchus prosthemelas SCLATER AND SALVIN, Proc. Zool. Soc. Lond., p. 323, fig. 4, 1870 (*type*, from Indefatigable Island). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 563, 1896; Bull. U. S. Nat. Mus., 50, Pt. 1, p. 485, 1901.

Geospiza prosthemelas ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 169, 1899.

Range. — Narboro, Albemarle, James, Duncan, Jervis, Indefatigable, Charles, Gardner (near Charles), Barrington and Cowley.

Adult Male. — Cat. No. 4536, Leland Stanford Jr. University Museum; James Island, April 21, 1899. Head and neck all around and breast black. Back and upper surface of wings and tail dark dusky brown. Rump and upper tail coverts paler brown. Belly and under tail coverts white; sides and flanks brownish; lower part of breast white, streaked with black. Lower surface of wings and tail grayish-brown. Under wing coverts dusky-gray anteriorly, whitish posteriorly. Bill black. Feet dark brown. Length 105 millimeters, wing 63, tail 38, culmen 10.7, gonys 5.7, width of bill at base 6.3, depth of bill at base 8, maxilla from nostril 7, tarsus 20.5.

There is a considerable amount of variation amongst the fifteen specimens of adult males in the collection, specially in the coloration of the lower parts. Some have the back and upper surface of the wings lighter than in the one described, contrasting more strongly with the black of the head. The feathers of the throat and breast may have only the central areas black, the marginal parts being white. In some not only the belly but the lower part of the breast and the sides are white, the sides being streaked with brown. Still others have almost no dusky below, except on the throat, where the central areas of the feathers are black, the general color of the under parts in such specimens being yellowish-olive, shaded on the breast and sides with buff. The top of the head may be black with narrow olive-yellowish edges to the feathers, the back, wing- and tail-coverts olive-brownish, with the central areas of the feathers darker, the wing and tail quills brown with yellowish-olive edgings. The bill in such specimens is entirely black, indicating that the birds are adults. Since comparatively few of the males have purely black heads, we may assume that the acquisition of this character is rather late in the life of the bird.

Adult Female. — Cat. No. 4372, Leland Stanford Jr. University Museum; Tagus Cove, Albemarle, March 18, 1899. Feathers of the upper parts dark brown centrally, with yellowish-olive borders narrowest on the head and widest on the lower back and rump. Wings and tail dusky-brown, the feathers edged with yellowish-olive. Lower parts dirty buffy-gray, whitish on the belly. Obsolete streaks of brown on the breast and sides. Bill black. Feet brownish-black.

The streaking of the under parts and the proportion of olive and brown on the back in adult females varies, but such differences are

apparently due to the degree of abrasion of the feathers. Some of the females have a pale superciliary stripe, a character of the young of *Camarhynchi* and adults of *G. pallida*.

Immature Males and Females (Stage II). — Upper parts blackish and olive, the black occupying the central areas of the feathers and the olive the edges. In some the olive predominates, in others the black. Under parts buffy-grayish, in older specimens streaked with brown in the breast. Middle and greater wing coverts with wide buffy tips forming two bands across the wing. Bill pale yellowish. Feet brown.

Young Males and Females (Stage I). — Above olive-brownish, the brown color occupying the central areas of the feathers, the edges of the feathers yellowish-olive, this color often almost concealing the darker central color. Wings as in older specimens. Below pale yellowish-olive or buff, obscurely streaked on the breast and sides with brown. A yellow superciliary stripe.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza prosthemelas prosthemelas*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Width of Bill at Base.	Depth of Bill at Base.	Maxilla from Nostril.	Tarsus.
4427	Narboro.	♀	106	57.5	39.5	11	6	6.5	8	7.5	20.5
4317	Albemarle.	♂	115	62	38	11.5	6	6	8.5	7.5	20
4396	"	"	110	61	36	11	5.5	6	8	7	20
4246	"	"	113	61	39	10.7	5.5	6.5	8	7	20.5
4310	"	"	121	61	39	11.5	6	6.5	8.5	8	20.5
4327	"	"	110	64	37.5	11	5.7	6.5	8.3	7	20.7
4362	"	"	116	60	39	11	5.5	6.3	8	7	20
4257	"	"	113	62.5	41	12	5.5	6.5	8	7	21
4105	"	"	110	62	44	11.3	5.7	6.3	8	7	20
4234	"	♀	117	60	43	11	5.3	5.5	7.7	7	19.5
4155	"	"	111	58	42	11	5.5	6.3	8	7	19
4318	"	"	116	60.5	33.5	11.5	5.5	6.5	7	7	19.5
4268	"	"	111	61	37	10.5	5.3	6	7	6.5	20
4372	"	"	110	61	37	10.5	5.3	6.5	8.5	7	19
4536	James.	♂	105	63	38	10.7	5.7	6.3	8	7	20.5
4544	"	"	112	62	36.5	11	5.3	6.5	7.7	7	19.7
4509	"	"	110	63.5	45	11	5	6	7.5	6.7	20
	"	"	115	62.5	39	11	5.3	6	7	6.5	20
4532	"	"	106	64	46	11.5	6	6.3	7.3	7.7	20
4527	"	"	110	62	42	11	5.3	6	7.5	7	19.5
4605	"	♀	111	56	38	11.5	5.5	6	7.5	7	18.5
4554	"	"	104	60	41	11	5.3	5.7	8	7	19
4739	Charles.	♂	115	62	40	12	5.7	6.5	8	7.5	18.7
4727	"	"	115	62	39.5	11.7	5.5	6	8.5	7.3	20
4732	"	♀	120	58.5	38	11.3	5.5	6	7.3	7	19
4741	"	"	110	60	35	11.5	5.5	6	7	7	20

On these olive-yellowish specimens there is not enough brown below on the feathers to give the color of the spotted immature form merely by a wearing away of the paler marginal parts of the feathers. Hence, there must be, as in the case of *G. pallida*, a moult intervening between the olive-yellow stage and the spotted stage involving a change in the color of the feathers. When feathers are acquired having large subterminal brown spots the olive above and the yellowish below may yet, however, be indefinitely retained through not being worn off so as to expose the brown.

Our specimens were taken at Iguana Cove, Albemarle, in December and March; at Tagus Cove, Albemarle, in June; on James in April, and on Duncan and Charles in May.

This is the smallest species of the subgenus *Camarhynchus* and one of the smallest of the *Geospizæ*, being about the same size as *G. fuliginosa*. The bill is nearest in shape to that of the subgenus *Geospiza* and probably represents the first step in the bill variation along the *Camarhynchus* line.

The following two pairs of specimens were taken mated with each other: Nos. 4246–4268, 4532–4554.

55*b*. GEOSPIZA PROSTHEMELAS SALVINI (Ridgway).

Camarhynchus salvini Ridgway, Proc. U. S. Nat. Mus., xvii, p. 364, 1894 (Chatham Island), and xix, p. 561, 1896; Bull. U. S. Nat. Mus., 50, Pt. 1, p. 486, 1901.

Geospiza salvini Rothschild and Hartert, Novit. Zool., vi, p. 169, 1899.

Range. — Chatham.

This form is very close to *G. p. prosthemelas*, averaging slightly larger with a heavier bill, approaching *G. paupera* in size.

The collection contains seven adult specimens from Chatham taken in May. Five are apparently adult males, one of which has the head and throat black, but the color does not extend so far down on the chest and sides as it does in most of the adult males of *G. p. prosthemelas*. The other males, apparantly immature in plumage, are streaked below anteriorly, being in the plumage described as *adult* by other authors. Our specimens are no more olivaceous than those from Albemarle, but are considerably more so than those from James.

The Charles Island specimens of *G. p. prosthemelas* is intermediate in size between *G. p. salvini* and *G. p. prosthemelas* of the other islands, although some specimens from most of the islands within the range of the latter species are equal to *G. p. salvini* in size.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza prosthemelas salvini*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4794	Chatham.	♂	125	66	40	12	6	6.7	8.5	7.3	21.5
4823	"	"	123	69	40	12.5	6	7	9.3	8.3	21.5
4711	"	"	122	62	39	13	6.5	6.5	8	8.5	21
4802	"	"	124	63	39	12.5	6.3	6.7	8.7	8	21.3
4710	"	♀	115	59	35	11	6	6.3	8	7	20.5
4708	"	"	122	62	37	12	6.3			8.5	20.5

56. GEOSPIZA PAUPERA (Ridgway).

Camarhynchus pauper RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 111, 1889, and XIX, p. 559, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 483, 1901.
Geospiza paupera ROTHSCHILD AND HARTERT, Novit. Zool., III, p. 169, 1899.

Range. — Charles Island.

This species approaches *G. habeli* in the shape of the bill but it is much smaller and the adult males have the head and chest less blackish.

We have three specimens, two of which are adult males, but both lack blackish heads, being streaked on the throat and chest with dark brown. These were taken near the higher central part of the island to which they seem to be confined, none being seen near the coast.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza paupera*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width.	Basal Depth.	Maxilla from Nostril.	Tarsus.
4788	Charles.	♂	135	69	47	14	7.3	7	9.5	9.5	21
4740	"	"	118	70	39	13.3	6.3	7	9	8.5	22

57. GEOSPIZA HABELI (Sclater and Salvin).

Camarhynchus habeli SCLATER AND SALVIN, Proc. Zool. Soc., pp. 323, 325, fig. 3, 1870.— RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 555, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 480, 1901.
Camarhynchus bindloei RIDGWAY, Proc. U. S. Nat. Mus., XVIII, p. 294, 1895, and XIX, p. 556, 1896.
Geospiza habeli ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 168, 1899.

Range. — Abingdon and Bindloe.

This species is intermediate in size between *G. psittacula* and *G. affinis*, but with a differently shaped bill. The bill is not so deep and considerably more elongate.

We have three adult specimens of this species from Abingdon and Bindloe. Immature birds common on Abingdon, but adults rare, only two having been seen. Only a few seen on Bindloe.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza habeli.*

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width.	Basal Depth.	Maxilla from Nostril.	Tarsus.
5200	Abingdon.	♂	130	71	39	16	8.5	8.5	11	10.5	22
5141	Bindloe.	"	140	69	44.5	16	8	8.3	11	10.7	23
5131	"	♀	144	73	46	16.5	7.7	8	10.5	10.3	21.5

58. GEOSPIZA INCERTA (Ridgway).

Camarhynchus incertus RIDGWAY, Proc. U. S. Nat. Mus., XVIII, p. 294, 1895 (James Island) and XIX, p. 560, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 482, 1901.

Geospiza incerta ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 168, 1900 (James and Duncan Islands).

Range. — James and Duncan.

This species was not seen by us. According to Rothschild and Hartert it is a very doubtful form and is probably not different from *G. affinis.*

59. GEOSPIZA AFFINIS (Ridgway).

Camarhynchus affinis RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 365, 1894, and XIX, p. 554, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 481, 1901.

Goespiza affinis ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 168, 1899.

Range. — Albemarle.

This species is very similar in the shape of the bill to *G. psittacula psittacula.* All of our specimens are considerably smaller than the specimens of *G. p. psittacula*, but the two would probably be found to intergrade if a large series could be compared.

We have five specimens from Iguana Cove, Albemarle, two of which are adult males; the others have immature plumage, but have black bills and are of adult size. This species is not common at Iguana Cove and appears to be very rare about Tagus Cove, where only a single immature specimen was secured during several weeks of collecting.

In June these birds were heard at Iguana Cove singing a song which may be represented by *twĭr'e-twēē-twēē-ēē-ē.*

MEASUREMENTS OF *Geospiza affinis*.

Cat. No Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4335	Albemarle, Iguana Cove.	Ad. ♂	127	66	40	12	6.5	8	10.5	8.5	22
4041	" " "	"	127	69	47	14	6.5	8	10	9.3	24
5104	" " "	Im. ♂	130	67	42	13	6.3	7.7	10	8.5	20
3884	" " "	"	130	69	40	13.7	7	7.7	10.5	9	21.5
4071	" " "	"	120	68	44	13	6.3	7.3	9	8	20.5

60. THE GEOSPIZA PSITTACULA SERIES.

60*a*. GEOSPIZA PSITTACULA PSITTACULA (Gould).

Camarhynchus psittaculus GOULD, Proc. Zool. Soc., p. 6, 1837.—RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 552, 1896 (James Island ?); Bull. U. S. Nat. Mus., 50, Part I, p. 477, 1901.

Camarhynchus rostratus RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 363, 1894.

Camarhynchus compressirostris RIDGWAY, Proc. U. S. Nat. Mus., XVIII, p. 294, 1895, and XIX, p. 558, 1896.

Geospiza psittacula psittacula ROTHSCHILD AND HARTERT, Novit. Zool., VII, p. 167, 1899.

Range.—James, Jervis, Indefatigable, Duncan and Barrington.

Only four specimens of this species are in the collection, two of which are adults from James, one immature male from Barrington, and a young female from Indefatigable.

This species approaches nearer *G. crassirostris* in the shape of the bill than does any other of the smaller species of the subgenus *Camarhynchus*, but it stands much nearer *G. affinis*, which is perhaps only a smaller billed subspecies. In size and coloration it approaches closely to *G. habeli* but the bill is much thicker and the culmen more convex.

This is, apparently, a rare species throughout its range. It is found sparingly on James, where four were seen during two days of collecting.

MEASUREMENTS OF *Geospiza psittacula psittacula*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4528	James.	Ad. ♂	130	74	44	16	7.7	9	11.5	10	22.7
4473	"	"	125	75	45	16	8	8.5	12	10.7	24
4977	Barrington.	Im. ♂	129	69	40	15	7.3	8	12	10	22

60*b*. GEOSPIZA PSITTACULA TOWNSENDI (Ridgway).

Camarhynchus townsendi RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 110, 1890.
Camarhynchus psittacula RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 552, 1896.
Geospiza psittacula townsendi ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 167, 1899.

Range. — Charles Island.

We did not procure any specimens of this form. It was described from Charles by Ridgway in 1890, but in 1896 included by him under *G. psittacula*. In 1899 Rothschild and Hartert doubtfully based the subspecies *G. psittacula townsendi* on four specimens from Charles.

61. GEOSPIZA CRASSIROSTRIS (Gould).

Camarhynchus crassirostris GOULD, Proc. Zool. Soc. Lond., p. 6, 1837 (Galapagos Islands). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 551, 1896.
Camarhynchus variegatus SLATER AND SALVIN, Proc. Zool. Soc. Lond., pp. 323, 324, 1870. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 549, 1896.
Geospiza crassirostris ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 166, 1899.
Platyspiza crassirostris RIDGWAY, Bull. U. S. Nat. Mus., 50, Pt 1, p. 474, 1901.

Range. — Charles, Chatham, Indefatigable, Jervis, James, Duncan, Albemarle, Narboro, Abingdon and Bindloe.

This is the most abundant and widely spread species of the subgenus *Camarhynchus*, and, as do the other species of the same group, it inhabits the moister and more wooded regions of the Archipelago. We found it common on the higher parts of Narboro, at Iguana Cove on Albemarle and on James. It is also common at the eastern end of south Albemarle.

In size and proportions of the bill *Geospiza crassirostris* stands apart from the other species of *Camarhynchus*, being much larger and having a much thicker and wider bill, it having been made by Ridgway, on account of this last character, the type of a separate subgenus, *Platyspiza*. In coloration it resembles the smaller species, but the males are more olivaceous and not so extensively blackish anteriorly and the females are more streaked below.

On the south side of Narboro, at an elevation of about two thousand feet, this species was found nesting in April. A nest containing four incubated eggs was taken April 5 in the branches of an acacia bush three feet above the ground.

This nest is ovate in shape, the lower end being the larger, covered above, and has the entrance in one side above the middle. It is composed of small, dry, flexible, tendril-like twigs of some vine, woven all through which are mat-like masses of a yellowish (when dead) lichen. The height of the nest is 150 millimeters, and the width at

the entrance is 120 millimeters. The entrance is ovate with the larger end below; the vertical diameter is 65 millimeters, the transverse 50 millimeters. There is no special lining to the nest. The floor is very compact and hard.

The eggs are about the size and shape of those of *G. strenua* but differ somewhat in coloration. The ground color is pale greenish-white, marked chiefly about the larger end, but not in the form of a wreath with brownish, chestnut, umber and lavender. The darker markings are confined to the apex where they sometimes form short scrawly marks. One of the specimens lacks the darker markings of the large end and is quite indistinguishable from specimens of *G. strenua*. Three of the eggs measure 24 × 17, 23 × 18, 24 × 17.

The song of this species is very different from any of the typical *Geospiza* songs. It was heard only on Narboro and sounded like *chĕr-kĕ-rēē-zēē-ēē-ē*. The song begins low and is gradually brought up to a climax at the finish.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza crassirostris*.

Cat. No. Stan Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4443	Narboro.	♂	166	77.3	56	15	7.3	9.3	11.5	10	24.5
4421	"	"	154	81.3	52.5	14.7	7	9.5	12.5	10	27
4452	"	"	161	77	52.5	14.5	7	8.5	11.7	9.7	26
4445	"	"	164	78	54	15.5	7	9.5	11.7	10	24.5
3878	"	"	155	83	48	17	7	10	12.3	10	28
4422	"	♀	158	76	53.7	15	6.7	8.7	11.5	10	24
4451	"	"	161	76	51	13.5	7	8.5	11.5	9.3	26.5
4454	"	"		77.5	51	14	7	9.5	11.5	10	27.5
4450	"	"	164	72	52.5	14.5	6.5	9.5	12.5	10	25.5
3972	"	"	157	78	53	16.5	7	9	12	10	25.5
3934	Albemarle.	♂	158	83	52	16.3	7	10	12.5	9.7	27
3954	"	"	163	85	54	18	7.3	10	13	11	29
4090	"	"	167	81	49	17.5	7	9.3	12.5	10	26.5
3935	"	"	158	82	55	17	7.5	9	12	10	26.5
3944	"	"	170	87	52	17.5	7.5	10	13	10	27.5
4331	"	♀	155	81	52.5	15.5	7	9.3	11.5	10.3	28
4589	James.	♂	166	84	56	18.5	7.3	10	13.7	11	29
4616	Duncan.	♀	156	80	54	17	7.5	10	12	10.5	23.5
4793	Chatham.	"	163	85	50	17	7.5	10	13	10	28.7
5278	Abingdon.	♂	163	84	53	17.5	7	10	13	11	26
5287	"	♀	160	77	56	16	7.3	9.7	12.5	10	27

The following numbers represent pairs taken mated: 4443–4451; 4421–4422.

Subgenus **Geospiza** Gould.

Geospiza Gould, Proc. Zool. Soc. Lond., p. 5, 1837. (Type, *Geospiza magnirostris* Gould.)

Adult males almost entirely black, under tail coverts edged with whitish; sexes dissimilar; females never blackish; the young resemble the adult female; bill conical but varies greatly in size and proportions; culmen generally straight.

During their growth males of this subgenus go through Stages II to VI. There is never at any age any plumage resembling the yellowish-olive plumage of Stage I in *Cactospiza* and *Camarhynchus*. Young birds in the first plumage are in Stage II. The adult female is the same as in the two preceding groups.

The evolution of this subgenus is not so simple as that of *Camarhynchus*. *G. fuliginosa parvula* we take as the most generalized member of the group, partly because it is most convenient to form a series beginning with it, and also because it resembles in size and general proportions *Geospiza* (*Camarhynchus*) *prosthemelas* with which we started the *Camarhynchus* series. Starting with *G. fuliginosa parvula*, and constructing the series according to the size and shape of the bill, we can form a continuous line from *G. fuliginosa parvula* to the more slender billed varieties of the same species, and from these through *G. debilirostris* and *G. septentrionalis* to the more slender billed members of the subgenus *Cactornis*. In the latter subgenus there is again an evolution in the color, consisting of a farther advance in melanism affecting the young of both sexes and the adult females. From *G. fuliginosa parvula* also a second line branches off in the opposite direction with regard to the size of the bill, *i. e.*, instead of becoming longer and more slender, the bill becomes proportionally larger and thicker at the base. This series begins with *G. fortis fortis*, runs through the other varieties of the same species, and then through *G. darwini* and *G. strenua* to *G. magnirostris*.

The species *G. conirostris we place in the subgenus Cactornis*. This is contrary to any disposition of it made by other authors, but the species have heretofore been grouped solely according to the shape of the bill. This, we think, is certainly a mistake, for the color is so characteristically different in the four groups as we here give them, and manifestly so much more constant than the shape of the bill, that we feel confident in relying on it as being a more important character for classifying the members of the genus. However, the bill in *G. conirostris propinqua* almost grades into that of *G. scandens*

rothschildi, so that there is scarcely a break in the bill series of *Cactornis* even when *G. conirostris* is included in it.

62. THE GEOSPIZA FULIGINOSA SERIES.

This series comprises all the smaller billed forms of *Geospiza*. Under it we include the subspecies *G. f. parvula*, *G. f. fuliginosa*, *G. f. minor*, *G. f. acutirostris* and *G. f. difficilis*. It is represented on every island of the archipelago except the two most northern and smallest ones — Wenman and Culpepper. The bill varies within the following limits: Culmen 12–15.5, width of bill at base 6.3–8, depth of bill at base 6.5–10.

The species is the most abundant in individuals almost everywhere that it occurs, as well as the most widely distributed.

62*a*. GEOSPIZA FULIGINOSA PARVULA (Gould).

Geospiza parvula GOULD, Proc. Zool. Soc. Lond., p. 6, 1837 (James). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 529, 1896.

Geospiza fuliginosa fuliginosa ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 161, 1899.

Geospiza fuliginosa RIDGWAY (not of GOULD), Proc. U. S. Nat. Mus., XIX, p. 526, 1896; Bull. U. S. Nat. Mus., 50, Pt. 1, p. 504, 1901.

Range. — James, Albemarle, Narboro, Duncan, Jervis, Indefatigable, Seymour, Barrington, Charles, Gardner (near Charles) and Hood.

Most of the specimens referred to *Geospiza parvula* by Ridgway are undoubtedly simply small sized specimens of the same species that he called *Geospiza fuliginosa*. Rothschild and Hartert state that "the type of *G. parvula*, according to Darwin, had been collected on James Island." Hence the name *Geospiza fuliginosa parvula* (Gould) must be given to the representatives of *G. fuliginosa* inhabiting the islands given above, since these differ slightly as a whole from the representatives on Chatham to which the name *G. fuliginosa fuliginosa* (Gould) must be given.

The bill of *G. f. parvula* is shaped like that of *G. fortis* but is considerably smaller, the culmen averaging about thirteen millimeters, being always less than fifteen. The variety differs from *G. f. fuliginosa* in the shorter but less slender bill. Some specimens from the northern slope of Narboro have unusually slender bills which nearly equal in length those of the longest billed Chatham specimens.

This is the most abundant form of *Geospiza* in the archipelago. It outnumbers in individuals all the other species together almost everywhere that it occurs. On account of its being the most easily

studied species, and also apparently the most generalized of the subgenus *Geospiza*, we give the following detailed descriptions of the different stages which were briefly outlined in the introduction to the genus. The birds in the first plumage are in Stage II, Stage I having been apparently crowded out of the life history in the subgenera *Geospiza* and *Cactornis*.

Stage II. Young Males and Females just out of Nest. — This stage represents the first phase of the plumage of birds of both sexes after leaving the nest and is characteristic of young birds of the first year during spring and summer. We have no specimens taken later than June, so we do not know when the change from this stage to the next takes place. Young birds taken in December and January are in Stage III.

Feathers all soft and lax. Top of head and back brownish or dusky, the feathers with buffy, sometimes with buffy-yellowish margins widest on middle of back and on rump. Wing feathers sooty-brown, all of them with buffy-yellow edgings, these widest and most yellow on the greater coverts, narrowest and grayer on the outer edges of the primaries. Upper surface of rectrices dusky-brown, higher than the wings, edged with olive-buff. Sides of head and lower parts grayish-buff, more or less spotted with brown, especially on the throat and breast. Some specimens are almost uniformly pale below; others are thickly spotted. Each feather below has the concealed basal part dark slaty-plumbeous, the marginal part grayish-buff and between these two colors an arrowhead-shaped spot of dark brown. The size and intensity of this spot varies; when small it is almost entirely concealed by the buffy marginal color, and when large it causes the conspicuously spotted appearance of some specimens. Lower surface of wings and tail brown, paler than above, the primaries and secondaries with pale grayish inner margins. Bill either plain pale yellowish or yellow with the upper mandible clouded with light brownish. Feet blackish-brown. Examples: Leland Stanford Jr. University Museum Catalogue Nos. 4349, 4539, 4541, Iguana cove, Albemarle, March; No. 4539, female, James, April; No. 4541, male, James, April.

Stage III (a) Young Males and Females of the Winter Months. — Young birds are mostly in this stage about Tagus Cove during December and January. When the plumage is attained we do not know, for we have no specimens taken earlier than the last of December.

Plumage compact and of the same texture as in adult birds, not loose and soft as in Stage II. Upper parts brownish. The central areas of the feathers dusky-brown, the marginal parts lighter

brown, but not buffy as in Stage II; the pale margins narrowest on the head, widest on the rump. Upper surfaces of wings and tail sooty brown, somewhat lighter than the central parts of the feathers of the dorsum; the primaries narrowly edged with ashy-gray. The greater coverts rather widely edged with buffy-brown; secondaries and rectrices more narrowly edged with buffy-brown. The buffy edgings on the coverts are duller and not so conspicuously yellow as on birds in Stage II. Below pale grayish with a slight buffy tinge on the belly and sides, the feathers with subterminal arrowhead shaped brown spots producing a streaked or spotted appearance on a pale ground formed by the light marginal parts of the feathers. The spots most numerous on the throat, breast and sides; the middle of the abdomen plain. Under surface of wings and tail as in last stage. The bill may be entirely yellowish, entirely dusky-yellowish, brownish-yellow with dusky tip, or entirely brownish above and yellowish below or yellowish below with the tip dusky. Feet blackish brown. (Examples: Leland Stanford Jr. University Museum Cat. No. 3880, female, Tagus Cove, Albermarle, January; No. 4202, female, Tagus Cove, January; No. 4194, female, Narboro, April; No. 4194, female, Tagus Cove, January; No. 4106, Iguana Cove, December.)

(*b*) *Adult Females.* — In plumage the adult female belongs to Stage III, being almost indistinguishable, except by the color of the bill, from young birds in the stage just described. The females, however, differ from young birds in this stage in lacking the buffy margins to the wing coverts, these being narrowly margined with grayish-brown. The bill is in some cases perfectly black as in the male, but it generally has a distinct brownish color rather than black, and in breeding birds the lower mandible may be pale brownish. Feet blackish-brown. (Examples: Leland Stanford Jr. University Museum Cat. No. 4369, female, Tagus Cove, March; No. 4392, female, Tagus Cove, March; No. 4406, female, Tagus Cove, March; No. 4409, female, Tagus Cove, March — all taken mated with adult males.)

Stage IV. Immature Males. — In this stage the males begin to differentiate from the females in the color of the plumage. Birds in this stage are similar in general pattern of coloration to males in the last stage. They differ, however, in having the dusky areas of the feathers of the lower parts much larger, so that below the specimens appear covered with crowded brown spots, especially on the throat and breast. The belly is generally mostly free from spots, but both the belly and sides are strongly shaded with brownish-buff. The bill is generally black, sometimes entirely so, but generally somewhat paler

beneath or with a pale spot on the gonys. Feet blackish-brown. (Examples: Leland Stanford Jr. University Museum Cat. No. 4072, male, Iguana Cove, December; No. 4075, male, Iguana Cove, December; No. 4104, male, Iguana Cove, December.)

Stage V. Immature Males (Older than the Last). — Head all around, throat and breast continuously black. Feathers of the back with dusky centers, but with paler brownish margins, the brown lightest and most extensive on the rump. Upper tail coverts same as feathers of back. Upper surface of wings and tail dusky brown, the primaries and greater wing coverts edged with pale grayish-brown, the secondaries and rectrices edged with light but not grayish brown, as are the feathers of the back. Lower surface posterior to the breast buffy-whitish, streaked with brown along the sides. Lower tail coverts buffy-whitish. Lower wing coverts grayish and dusky. Lower surface of wings and tail grayish-brown; the inner edges of the primaries pale grayish. Bill generally black, but may have some yellowish on either or both mandibles. Feet blackish-brown.

This stage in the subgenus *Geospiza* represents the adult males of the subgenus *Camarhynchus*, while Stage VI represents the advance of *Geospiza* and *Cactornis* beyond *Camarhynchus*. (Examples of Stage V: Leland Stanford Jr. University Museum Cat. No. 4101, male, Iguana Cove, December; No. 5087, male, Iguana Cove, June.) Birds in this stage are rather scarce, a fact perhaps indicating that the stage is quickly passed through.

Stage VI. Adult Males. — The most melanistic forms are colored as follows: General color black, deepest anteriorly. The basal concealed part of each feather pale slaty-gray, this color abruptly demarcated from the wide black marginal part; there is no trace anywhere of a paler brownish margin beyond the black. On the rump the black part of the feathers is narrower so that the color is easily exposed if the feathers are slightly disturbed. The primaries, inner webs of the secondaries, and the rectrices dusky-brownish, somewhat contrasting with the rest of the dorsum and the exposed parts of the secondaries. Under tail coverts margined on the exposed parts with pale buffy-white. Under wing coverts black. Under surface of wings and tail dark grayish-brown, on the wings contrasting strongly with the black of the under wing coverts. Bill always entirely black. Feet blackish-brown. (Examples: Leland Stanford Jr. University Museum Cat. No. 4187, male, Tagus Cove, January; No. 3938, male, Iguana Cove, December — these taken mated with adult females.)

This plumage is characteristic of adult males of all species of the subgenera *Geospiza* and *Cactornis* and represents the farthest advance toward complete melanism that any of the *Geospizæ* have reached.

There are all gradations between Stages V and VI. The black color invades the lower breast, sides and abdomen as the pale margins of the feathers disappear, the latter color remaining longest on the lower abdomen, flanks and under tail coverts, never entirely disappearing from the tips of the latter, and most of the blackest birds have the under tail coverts broadly margined with pale rusty or buffy. Also the primaries never become pure black, but in all cases retain a distinct brownish color.

Plumage of Nestlings. — Very young birds having yet no wing quills have four groups of very fine plume-like feathers on the head, two on each side. One group forms an oblique line on the dorso-lateral aspect of the head extending from a point above, and a little back of the middle of the eye, backward and downward, ending a little below the upper level of the orbit and over the posterior end of the ear slit. The second group is situated on an oblique line on the lower part of the back of the head on a level with the ear; it is shorter than the upper, and extends from without downward and inward. On the body and appendages there are eight groups of these plume feathers, arranged in four pairs as follows: a longitudinal row on the posterior edge of the forearm, a transverse line across the back of the middle of the humerus, a transverse line across the back of the femur near its proximal end, a row along each side of the median line of the back on the position of the enlarged part of the dorsal pteryla of later stages. There is no plumage on the ventral surface of the head or body at this age.

The young wing quills, in nestlings a little older than those described in the last paragraph, are of a pure bluish-slate color, tipped with pale buffy-white. The greater coverts of the primaries are the same as the quills. The middle and lesser primary coverts and all the secondary coverts have long reddish-brown terminal parts. The tips of all the coverts, especially those of the secondaries, bear long and very fine buffy plumes. In older specimens not only the wing coverts but also the feathers of the middle of the back are strongly tipped with reddish-brown.

Pterylosis. — The following description of the pterylosis of *Geospiza fulginosa* applies to all members of the genus. The dorsal pteryla runs down the back of the neck as a very narrow band, being much narrower than the cervical part of the ventral pteryla. At

the middle of the back, however, it expands greatly, forming a large oval patch which extends posteriorly to the anterior part of the lumbosacral region. Here the dorsal pteryla again contracts into a narrow median band which extends along the middle of the rump to the oil gland, expanding very slightly back of the acetabula. The ventral tract forms anteriorly a single band along the upper and middle parts of the ventral side of the neck. A little below the middle of the neck it bifurcates and each half runs outward and posteriorly on the side of the neck to the shoulder. Here it gives off laterally a shoulder band which in turn divides into the alar and humeral tracts. The main pterylæ continue posteriorly on the sides of the breast. The two diverge considerably, each becoming wider and extend along the side of the abdomen to the knee. Here each contracts again and runs down the front of the abdomen to near the anus, the two converging once more.

Color of the Bill. — The general development of the color of the bill in the male is as follows: early in the life of the bird, in the beginning of Stage II, both mandibles of the bill are yellow. Soon the upper begins to become clouded with dusky, the yellow remaining longest as a spot on the culmen generally near the tip of the mandible. When the upper mandible has attained this coloration the lower begins to become dusky, the dark color beginning at the tip and later spreading over the whole mandible, the yellow remaining longest as a spot on the gonys. The dark color of both mandibles is at first brownish, later it becomes black. The color is developed in the same manner on the bill of the female, but, the acquisition of the dark color takes longer and the final tone is dusky-brown rather than black.

The development of the black color on the bill and on the plumage do not always progress at the same rate. Often birds may be found with perfectly black plumage, but with the bill partly yellow; the lower mandible may be even entirely yellowish. In birds only partly white below, the bill may be slaty-brown above and yellow below.

Relationship between Color of Bill and Plumage, and Maturity. — There is apparently no seasonal change of plumage in the males — adults being equally black, whether taken in January, March or June. The height of the nesting season is in March in most places.

The following observations on the development of the color of the plumage and bill are based on specimens taken at Tagus Cove, Elizabeth Bay and Iguana Cove, Albemarle, during the months of January, February, March and June. We were not at the same locality anywhere else long enough to make observations on these points else-

where. From Tagus Cove we have twenty two specimens of males taken in January, two taken in February and fourteen taken in March.

All of the clearly immature birds occur in the January and February lot. Most of the January specimens are in the brown plumage, Stage III, four are in Stage IV and two in Stage II. Both of the February specimens are in Stage V. Nearly all of the March specimens are in Stage VI or in a condition intermediate between Stage V and Stage VI. This is the typical breeding plumage. One specimen, however, is in Stage V and was taken apparently mated with a female. Another specimen taken mated with a female is actually in Stage III! This, then, shows that, although the black or nearly black plumage and sexual maturity generally coincide, yet the melanistic phase may be retarded. It is also evident that *the males do not become entirely dusky until the end of the first year.*

All the March males have the bill perfectly black. Few of the others, however, have the bill entirely black, most of them having some remnant of the yellow on the lower mandible, either as a definite spot near the tip of the gonys or as a diffusion over the base. Some even with purely black plumage have the lower mandible entirely yellow. Hence *the bill does not become entirely black until the end of the first year and may remain partly pale longer than the plumage.* The breeding male in plumage Stage III has the bill entirely black, thus resembling exactly the adult female. Hence, sexually mature males may have immature plumage, but we have no case of a breeding bird having an immature bill.

From Iguana Cove we have sixteen male specimens taken in January and two taken in March.

Of the January birds only four are in Stage VI, eight are in Stage V and IV or intermediate between the two, and three are in Stage III. Yet all of these birds except one (this one in Stage III) were apparently breeding males. The nesting season had here begun at this season and the males in all stages of plumage had the testes enlarged as if breeding. The breeding season at Iguana Cove begins about two months in advance of that at Tagus Cove. This difference is due most probably to the much greater humidity of Iguana Cove as compared with Tagus Cove. The breeding season lasts at least as long as it does at Tagus Cove, *i. e.*, until April. Hence, it is probable that birds hatched here during the last of a season begin breeding at the first of the season in the following year when they are only ten months old, being in Stage V or even IV, and, hence, before they have had time to acquire the full black plumage.

We have thirteen male specimens taken during the second half of February at Elizabeth Bay. The males are mostly in the black plumage and have black bills. Two are intermediate between stages V and VI. One is in Stage V but has the bill entirely black. The nesting season here had apparently just begun at this time. It is probable that it is of short duration as it is at Tagus Cove, and the birds have time to acquire the black plumage before they begin to breed.

There is a slight seasonal change in the plumage of the females due to the age and consequent abrasion of the feathers. Specimens taken in March compared with specimens taken in January average darker below with less of the pale color of the marginal parts of the feathers.

Only three of our specimens of females taken in March have perfectly black bills. In some cases the gonys is almost entirely yellowish and this is true of birds taken mated with males. Only two of the January specimens have dusky bills. Hence the bills of the females do not as a rule become black by the end of the first year, and apparently seldom become perfectly black, showing a tendency to remain, as does the plumage, in a non-melanistic condition. In this respect they differ from the males, which apparently regularly acquire black bills by the beginning of the breeding season.

Nature of the Change from one Phase of Plumage to the Next — Moulting. — The change in color of the *males* from the young to the adult consists not only of a spreading of the dark color from the head over the posterior parts, but also of a change from brown to black.

Of eleven breeding males taken at Tagus Cove in March three are in a plumage that could have been produced from the plumage of January birds in Stage V by abrasion of the pale tips of the feathers. The pale color is very conspicuous below on the belly, flanks and crissum, but less so than in typical examples of Stage V. The black of the other parts, especially of the back and rump is not intense as in birds most typical of Stage VI, but has a very distinct brownish tone. The tail and wing feathers are also much paler and more decidedly brownish than in the most melanistic forms. These brownish-black forms could not pass over into the purely black phase without a moult involving a change of color in the feathers, although they might be produced from Stage V simply through abrasion of the feathers.

We have one specimen, taken at Tagus Cove in February, which is in a stage intermediate between Stages V and IV. This specimen is moulting, but the new feathers coming in have the same pale edges and brown subterminal areas as the old ones.

Three specimens taken January 12 and one taken January 24, at Tagus Cove, all in Stage V or between this Stage and Stage IV, show traces of moulting, but none so much so as the February specimen. Any of these birds might attain the same plumage as the brown-backed, pale-bellied breeding birds of March through abrasion of the plumage involving a wearing away of the pale edges of the feathers.

There are three other birds from Tagus Cove taken in January in the brown-spotted phase, Stage III, which are also moulting. These, however, could not go over into Stages IV or V without a moult involving a change in the color of the feathers, for they are distinctly paler brown everywhere and not dusky. Another bird taken January 30 is dusky beneath but paler than specimens typical of Stage V, and has the bill pinkish-yellow clouded with dusky. It is moulting slightly.

There are in the collection sixteen male specimens taken at Tagus Cove in January. These vary from the purely black phase characteristic of Stage VI, to forms with dusky head, conspicuously brown backs and tail, pale rumps, and with much pale buffy-grayish on the edges of the feathers of the belly, flanks and crissum. One of these duplicates in coloration the palest of the breeding March birds. Among these dusky January birds, is one that has no pale color below except on the under tail coverts but has a few new feathers growing in; while several of those having pale bellies have many young feathers.

None of the specimens from Elizabeth Bay, taken in February shows any sign of moulting. Of thirteen males one is in Stage IV, two are in Stage V and several are in the brown-backed, pale-bellied breeding plumage intermediate between Stage V and Stage VI.

There are in the collection sixteen specimens from Iguana Cove taken in December, January and March. Only two of the December and January specimens show any indication of moulting. These are both in Stage IV; they have very much worn plumage and a few new feathers growing in. One of them has the lower mandible yellowish with black at the tip and base. The testes were enlarged as if the bird was breeding. The other has the bill almost entirely black with the exception of a yellowish spot on the culmen and another on the gonys. The testes of this one were somewhat enlarged. Hence, it appears that by the beginning of the breeding season, which here commences in January, most of the males have ceased moulting. The plumage of all the specimens is worn and does not have the appearance of having been newly acquired.

Most of the immature *female* specimens taken in January at Tagus Cove are moulting. Of the adult females only one is moulting — it has a few new feathers coming in on the back. Of the females taken in March only two (there are eighteen in all) are moulting — each of these having a few new feathers growing in on the dorsum. These two moulting adults were breeding since they were taken mated with adult males.

None of the Elizabeth Bay females, taken during the second half of February, is moulting, and only one Iguana Cove female, taken the last of December, is moulting. This latter is an adult, and, apparently, a breeding bird, and has a few new wing quills coming in.

The breeding (March) females from Tagus Cove have a different appearance from the immature females taken in January. They are much darker below, the brown color predominating, while in the January specimens the pale color predominates and the brown is almost restricted to the sides of the body and the fore-parts of the breast. In many cases it appears doubtful that the March phase could have been derived from the January phase simply by an abrasion of the feathers, for there is not enough brown on the feathers of the latter especially on those of the belly and lower breast, to produce so dark a tone as characterizes the March birds, even if the pale edgings were all worn off. This difference would, hence, indicate a slight change of color during the January moult which terminates during February.

The foregoing facts may be summarized as follows: during the time from December to February the males go through Stages III, IV and V, arriving at Stage VI by the first of March. In Stage VI they are at first, however, brownish-black instead of pure black. The females during the same time become slightly darker and acquire a larger proportion of brown on the plumage. Both males and females show all gradations of color from one phase of plumage to another, *i. e.*, there is no jump from one stage to the next as would be the case if one phase were due to a rapid loss of one set of feathers and a simultaneous acquisition of a new set. Corresponding with the gradual change in the appearance, which slowly leads from one stage to that following, is the fact that none of the birds that are moulting shows any extensive indications of doing so. In all cases the moulting process appears to be a gradual loss of old feathers and a corresponding ingrowth of new ones, for in no case are there more than comparatively a few new feathers to be seen growing in. The birds never appear denuded, and the total number of feathers appears to be always the same. (This does not apply to birds in Stage II.)

Along with the moulting of the feather there takes place a gradual change in the color of the feathers. The plumage becomes darker through the successive sets of feathers having not only more dark color but also a duskier shade of dark color and narrower pale edgings. In the male the color change is from light brown, through dark dusky brown to black; in the female from light brown to dark brown. The spreading of the dark color is due in part also to the wearing away of the light margins of the feathers, so that general color of plumage formed of old feathers is darker than that composed of new feathers. Hence, both males and females moult slowly and gradually from December into February, the new feathers having successively *more dark color on them*, and the dark color becoming successively *darker*, being always brown in the females but changing in the males from light brown, through dark and dusky-brown, to black.

Young birds taken at Tagus Cove in June are in Stage II. One male taken June 9 is in Stage V and is not moulting. We have no other specimens from Albemarle taken after the breeding season. Hence we do not know what phases of plumage the birds are in on Albemarle during the time from March till December. Birds taken on the other islands, however, during April, May and June are mostly either in Stage VI or in Stage II. We have twenty two males from Indefatigable and Seymour taken during the last of April and the first of May that are in Stage VI. One is in Stage V and has a few new feathers growing in on the breast. Several others are in Stages IV and III and most of these are moulting. Besides these there are numerous specimens in Stage II, birds just from the nest. From Charles we have two adult males in Stage VI, five adult females, and numerous young birds in Stage II. We have no material to indicate when the transition from Stage II to Stage III takes place. Nor do we know at what age adult males in Stage VI change from the blackish-brown phase to the purely black phase. The fact that many breeding males possess the blackish-brown plumage would indicate that the purely black plumage is not acquired until during the second year.

Habits, Song, Nests and Eggs. — *Geospiza fuliginosa parvula* is extremely abundant about Tagus Cove on Albemarle, living everywhere in the dry brush that covers the walls of the old tufa craters of this part of the island. The individuals commonly associate with one another in small flocks and often mix gregariously with the less abundant, larger-billed *Geospiza fortis*. Although their food consists almost entirely of seeds, yet many of the birds may

be seen along the shore feeding among the rocks below high water. During the dry season great numbers of them collect about the holes of fresh water a short distance south of Tagus Cove. This is the only fresh water of this part of the island, and birds that do not visit it must depend entirely on dew for water. In the mornings they may often be seen taking dew baths, perhaps never having known the luxury of a running stream. During the middle of the day many of these birds may be seen with gaping mandibles, in evident distress from the heat and dryness. Habel thinks that a large number of them, especially young birds, perish from want of water. They feed on both seeds and insects, picking up anything they can find and swallowing with their food a large quantity of gravel. They most frequently pick up their food from the ground, and it is this habit alone which has gained for them their name of "Ground Finch"; for they never build their nests on the ground, and except when feeding they are nearly always in the bushes and trees. Furthermore, they pick many insects from crevices of the bushes, eat berries and devour large numbers of Lepidopteran larvæ during the rainy months of February and March. Although spiders are numerous, the Geospizas seldom molest them.

The birds are generally abundant wherever vegetation is found, and their range extends to the top of the mountain back of Tagus Cove, four thousand feet above sea level. Only a few, however, live in the mangrove swamps to the north of Tagus Cove, most of them appearing to eschew these dense, wet places, preferring the dryer, sunnier and more desolate brush-covered areas.

Our first visit to Tagus Cove was made during January and the first week of February. The breeding season was not yet on, but the males did a good deal of singing, although there was not much variety in it then. Their song at this time, however, is characteristic of them, and can be recognized as the basis of almost all their numerous songs of the breeding season. It consisted of three repetitions of two connected syllables and may be represented phonetically thus: *teur'-wēē*, *teur'-wēē*, *teur'-wēē*, the accent on the first syllable. The single bisyllabic set is the fundamental element of all their singing. The consonant sounds vary a great deal, but it is difficult to observe them accurately and impossible to represent them by the sounds of letters. Their vowels come more nearly within the range of alphabetical sounds. The first syllable varies from a *teur*-sound to what may be represented by a German umlauted *u*, thus *tür'-wēē*, *tür'-wēē*, *tür-'wēē*. Everywhere about the cove the birds could be heard uttering this song. It was varied in many ways, but each set seldom had more than two

syllables. In some cases the vowel sounds were reversed, so that the song sounded like *tēē'-twür*, *tēē'-twür*, *tēē'-twür*. One bird was heard singing *tü'-dl*, *tü'-dl*.

When Tagus Cove was again visited (March 11 to 26), everything was greatly changed. Rains during February and the first part of March had caused a revolution in the vegetation, which was now green, in pleasing contrast with the former brown and barren aspect of the hills. The birds were in the height of their nesting season, almost all of the nests found containing either eggs or young birds. Everywhere the males were vigorously exerting their musical powers and the common song of January was replaced by longer and more elegant pieces of music, so that the *teur'-wēē* song was not nearly so prominent as before. The closest thing to it merely had the accent shifted to the second syllable, sounding like *teur-wēē'*, *teur-wēē'*. The song variety next removed consisted of a lengthening of the second syllable, so that it resembled *teur-lēē- - -ē'*, *teur-lēē- - -ē'*. Another song may be represented thus: *tew—twēē-twēē-twēē-twēē*. The *twee* syllable was generally repeated four times, but often only two or three times. The space between the first and second syllables was generally considerably greater than that between the others. No syllable had any special accent. One bird was heard singing with a great deal of force a song resembling *ēē'-zërt*, *ēē'-zërt*. Special stress was given to the first syllable which was also slightly elongated. A common song at this time sounded something like *tür-lēē'*, *tür-lēē'*. Another song resembled *tēē'-ŭl-tēē*, *tēē'-ŭl-tēē*.

During the breeding season the males sing almost continually and are constantly active. The females on the other hand, both when alone and when with their male companions, are very quiet and reserved, showing little excitement. They utter merely a single, low, prolonged note used by either bird of a mated pair as a call or an answer to the other when the two are feeding or hopping about in the bushes near each other. When a male is with his mate he is generally contented with flying or hopping about with her, making no demonstrations of his affection for her and giving no evidence of any unusual state of mind. It is when she is occupied with her domestic duties that the male gives vent to his emotions, pouring forth most lavishly all the songs of which he is capable. It must be said, however, that, although his efforts are good, his actual productions can by no means rank with those of even ordinary singing birds, and indeed anywhere else would scarcely pass for songs. One never hears from the Geospizas such songs as are uttered by the song-sparrow or house-finches.

The birds are scarce about Elizabeth Bay on Albemarle, for there is little vegetation here outside of the mangrove swamps, and, as said before, these salt swamps appear to be uncongenial to them. On the north side of Perry Isthmus, however, there is plenty of vegetation all over the side and about the base of the mountain there situated, and the birds were found abundantly at this place. We were here during February and it was noticed that *Geospiza fuliginosa parvula* uttered notes very strikingly different from anything heard elsewhere. The song was so very much like that of the swamp *Geospiza heliobates* that when we entered the mangrove swamp along the shore where the birds were singing, we supposed we were listening to this bird. Afterwards, however, a specimen in the act of singing the song was taken outside of the swamp and found to be *Geospiza fuliginosa parvula*. The song itself consisted of a repetition of a single note and resembled somewhat *t'wër-t'wër-t'wër-t'wër*. Each note had a double sound, the *t* being slightly separated, as if composed of a bisyllabic sound condensed into a single syllable. Three or four was the usual number of repetitions of the note.

During the time we were here the birds were nesting both in the mangrove swamps along the shore and in the trees and bushes inland. One male was noticed in a swamp reconstructing an old nest with material that he took from another old nest in a neighboring tree. While at work he constantly uttered in loud clear tones the song just described. He worked, however, very interruptedly, for he spent a great deal of time in flying about in a very excited manner from tree to tree, acting just as if he was living in a state of such happy expectation that he could scarcely contain his emotions. At intervals a female came around to inspect the nest. She was always very quiet and showed no excitement at all, very calmly examining the nest, but paying almost no attention to the male. She, however, or perhaps the delightful hope of her approval of the nest, was very evidently the sole cause of the male's exuberance of spirit. Whenever she appeared he flew about wildly, first to the nest and then to some neighboring branch and back again to the nest, all the time uttering with greatest energy the song described. Very curiously, however, he did not fly about the female nor keep close to her nor even look toward her more than in any other direction. Whenever he alighted anywhere he held his body in a depressed attitude and kept his wings rigidly half spread in a drooping oblique position, all the time turning partly from one side to the other. If the female went into the nest he went in also, or at least to the nest, and then either one or both of them uttered low

elongated notes sounding somewhat like *chēē*.....*ēē*. They uttered this note a number of times while observed but always either when both flew to the nest together or when one was at the nest and the other flew to it. It was impossible to observe whether at such times both birds uttered the note or only one, but two voices seemed to be distinguishable.

The birds have a common note that they utter on ordinary occasions, such as when they are hopping about in the bushes or when feeding. This is a short, low simple *chick*-like sound. Besides this they have another, a more lengthened note, having a sort of broken sound. This they use on more special occasions — it is almost always heard when a male flies after a female, apparently both of them uttering it.

The song of the birds at Iguana Cove was first observed during the latter part of December. At this time they were occupied with nest building and numerous unfinished and many completed nests were found, but only a few of the latter contained eggs. A very common song resembled the *teur'wēē* song of Tagus Cove, it being bisyllabic, having a vowel sound in the first syllable resembling a German umlauted *u* and in the second a long *e*. The song may be represented thus: *tül'-wee*, *tül'-wee*, the sets being generally uttered twice, often three times, in succession. Sometimes the second syllable was repeated several times; one bird was heard singing thus: *tül-twee-twee-twee*, *tül-twee-twee-twee*. Another song heard resembled the first described, but had the accent on the second syllable: *tü-lēē'*, *tü-lēē'*. Again the vowel sounds were reversed and the song sounded like *tēē'-twür*, *tēē'-twür*. The same variations take place with this; one bird was heard singing *tēē'-twür-twür-twür*, *tēē'-* etc., in each set of this song, the accent being given to the first syllable. Another bird sang a song of two syllables, in each of which the vowel had the *ü*-sound, and the first syllable was much prolonged, thus: *tü . . . . ü-twür*. This was uttered either by itself as an entire song or was followed by *twee-twee-twee*.

These varieties of song were all uttered by males in full black plumage, the usual breeding age dress. However, a brown-plumaged bird was observed singing a song resembling *tü . . . . ul . . . . l-wee*, the first syllable being greatly prolonged, although varying considerably in length, while the second was shorter and abruptly higher in pitch. Another brown-plumaged bird was observed acting exactly after the manner of a breeding male. He was rapidly and excitedly uttering a song somewhat like *tü-wēē'*, *tü-wēē'*, *tü-wēē'*, and was amor-

ously pursuing a second brown-colored bird, apparently a female, before whom he presented himself in a drooping attitude with spread wings. Several brown-plumaged males were shot which had the testes enlarged.

We visited Iguana Cove again during the first part of March. This time numerous sets of eggs, all well advanced in incubation, and several sets of young birds were found. Everywhere the males were singing continuously. Their song was even more varied than before, consisting in most cases of several syllables instead of two. One song resembled *tü wēē'-twēē-twēē-twēē*. The ordinary *tü'-wēē* song was heard, but it was not nearly so common as in December, while the songs with a greater number of syllables were much more common than then.

The same place was visited a third time early in June. The nesting season was now past and the birds were much less abundant on the flat to the east of Iguana Cove than during December and March, and but few were heard singing.

At Tagus Cove some fledglings were taken from the nest while the parents were absent. Both of the latter, however, soon came flying very excitedly about the place, keeping most of the time near the ground, repeating in rapid succession a short, sharp, *tweet*-like note. The young became very angry at being handled and uttered a a sound resembling *zēē''u*, *zēē''u*, *zēē''u*, etc. The long *e*-sound of the first syllable was somewhat prolonged and given a deep vibratory sound. Although the young birds were not yet able to fly, they uttered the notes in very resentful tones and bit savagely at the fingers of the person handling them.

Birds were observed on the Seymour Islands and the neighboring part of Indefatigable from April 26 to May 4. On South Seymour they were much more abundant than on North Seymour or on the part of Indefatigable visited. They were not nesting, but the males were singing a great deal, and most of the songs they sang were very noticeably different from the songs of the Albemarle birds. The song that they uttered most commonly resembled *teur'-lēē-hēē*, *teur'-lēē-hēē*, *teur'-lēē-hēē*. The first syllable of each set carried the accent, and the second and third syllables differed only in the initial consonant sound. The same individuals that sang this song often uttered the same syllables with the accent transferred to the second, thus: *teur-lēē'-hēē*, *teur-lēē'-hēē*, *teur-lēē'-hēē*. This song was almost as common as the other, and indeed a bird singing one almost always, sooner or later, changed to the other. Another song often heard sounded like

teur-lēē', *teur-lēē'*, *teur-lēē'*, *teur-lēē'*, nearly always consisting of four sets. This was similar to one of the songs of the birds at Tagus Cove on Albemarle, but the birds there seldom uttered more than two sets in succession. The Seymour birds were not heard to utter this song with the first syllable accented — a form of song so common with the Tagus Cove birds. Still another song resembled *tēē'-wēē-wēē*, *tēē'-wēē-wēē*, *tēē'-wēē-wēē*, *tēē'-wēē-wēē*.

On Charles Island this species was very common. In going up the trail from Black Beach Landing to the higher central part of the island the birds were found to be much more abundant along the second half than lower down where other forms predominated. In fact, only a few specimens of this species were found below the spring on the trail, situated perhaps a third or more of the distance up, while from here to the top it was by far the most common *Geospiza* species. We were at Charles Island during the first of May. A very common song resembled *teu-wink'*, *teu-wink'*. The second syllable had a decidedly different sound from anything heard elsewhere. They also sang *skēē'-wee*, *skēē'-wee*, *skēē'-wee*, or something of this sort; it being much the same in character as the common *teur'-wēē* at Tagus Cove, differing from this conspicuously, however, in the consonant sound of the first syllable.

On Duncan Island this species was the only common *Geospiza*. It was abundant within the crater, but ouside of it was scarce.

We have eight nests of *Geospiza fuliginosa parvula* taken about Tagus Cove on Albemarle Island during March. They are all very similar and resemble in shape the nest of *Camarhynchus crassirostris* already described. All are large, having the longest diameter vertical, varying in height from one hundred and forty to two hundred millimeters, and in width from ten to twelve millimeters. The entrance is generally oval and mostly above the middle of the side, being generally about fifty by forty millimeters in dimensions with the longer diameter vertical. The nest is entirely and thickly roofed over above, and often the part above the entrance is almost overhanging. The front is generally more or less flattened. The nests are never suspended, being always supported from below, but may have accessory lateral braces. Nests from Tagus Cove and Iguana Cove, Albemarle, are composed of slender stems of small plants, stems of vines, grasses and bark of larger soft plants. Four nests have interwoven all through the coarser material numerous bits of cotton plucked from the cotton bushes, which are abundant at both places. The cotton in the nests is all in isolated heads detached from their stems. Leaves are very sel-

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fuliginosa parvula*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
3995	Albemarle, Tagus Cove.	♂	112	62	42	12	6	6.7	8.7	8	18.3
3985	" "	"	115	65	46	13	6.5	6.5	8.5	8	19
3915	" "	"	112	62	38.5	12.5	6	6.5	8	8.5	18
3942	" "	"	—	64	—	12.5	6.3	7	9.5	8	19.5
3986	" "	"	110	63	42	13.3	7.3	6.7	9	9	19
3814	" "	"	110	64	46	14	7	7	8.5	9	18.5
4030	" "	"	115	63	41	13	6.7	6.5	9	9	18.5
3941	" "	"	105	63	41	12	6	6.7	8.7	8.5	18
4047	" "	"	120	65	48	13.5	6.7	7	8.3	8.5	20
4007	" "	"	111	63	38	12.5	6.5	7	10	8	19
4036	" "	"	120	65	40	13.5	6.5	7	9.5	8.3	19
4341	" "	"	120	61	44	13	6.5	6.7	8.3	8.3	18.7
4110	" "	"	120	63	42	13	7	6.7	8.3	8.3	19
4400	" "	"	112	62	44	12.7	6.3	7	9	8	20
4206	" "	"	112	64	45	13.5	6.3	7	9	8.5	18
4139	" "	"	115	63	42.5	12.7	6.5	7	8.5	8	19.7
4187	" "	"	112	64	42	12	7	6.5	8.5	7.5	19.5
4288	" "	"	—	62.5	41	13	6.5	6.5	8.3	8	20
4211	" "	"	126	62	45	14	7	7	8.5	9	20
4366	" "	"	—	66	40	12.5	6.5	7.5	9.5	8	19
4397	" "	"	122	64	38.5	13	7	7	9	9	19
4384	" "	"	116	64	43	13.5	7	7	8	8.3	20
4394	" "	"	113	64	41	13	6.5	7	9	8.3	19
4378	" "	"	122	64	39	13	7	8	10	8.5	17.5
4365	" "	"	—	61	41	13	5.3	6.5	9	8.7	19.7
4391	" "	"	112	65	37.5	13.5	7.5	7.5	8.5	9	20.5
4377	" "	"	122	62	40	13.5	6.7	7	9.7	8.5	18
4399	" "	"	112	62	39	13	6.3	6.7	8.5	9	19.3
4368	" "	"	118	64.5	39	12	6.5	7	9	7.5	18
4408	" "	"	120	63.5	38	12.5	6.5	7	9.5	8.5	19
3926	" "	♀	114	63	40	12.5	6.5	6.3	8.3	8	18.7
3913	" "	"	114	60	42	13	7	6.7	9	8.5	19
4162	" "	"	110	59.5	47	12	6	6.7	8.5	7.5	18.5
4193	" "	"	112	61	45	13	6.3	6.5	8.7	8	19.5
4261	" "	"	115	61	44	12.5	7	6.5	9.7	8	18.5
4286	" "	"	125	62	39	13.5	6.5	6.7	8.3	8.3	19
4779	" "	"	118	61.5	35	12.5	6.5	6.5	8	7.5	19
4398	" "	"	108	69	39	12	6.5	6.5	8	9	17
4383	" "	"	112	59	34	12.5	6.5	7	8	8	19.5
4343	" "	"	112	59	36.5	13	6.3	6.5	8.7	8	19
4359	" "	"	110	61	38.5	13	6	6.5	8.5	8	19.5
4395	" "	"	112	62	44	13	6.7	7	8.7	8	19.5
4364	" "	"	112	61	42	12.5	7	6.5	8	8.5	19
4349	" "	"	—	61	37	11.5	6	6	8	7.7	20
4392	" "	"	110	59	39	11.5	6	6.5	8	8	19
4401	" "	"	111	59	35	12	6.5	7	8.5	8	18
4406	" "	"	115	62	40	11.5	6.5	7	8.5	8	17.5
4402	" "	"	123	62	38	13	6.5	6.7	8.5	8	19
4367	" "	"	115	60	39	12	6.5	6.5	7.7	8	18
4369	" "	"	115	61	38	12	6.5	6.5	8.5	8	18

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fuliginosa parvula*.—*Continued*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4376	Albemarle, Tagus Cove.	♀	115	60	38	13	6.3	6.5	8.5	8	18.5
4388	" "	"	112	58.5	36.5	13.5	6.5	6	8.5	8	18
4409	" "	"	122	62	44	13	6.5	6.7	8.7	8.3	18.5
4250	" Elizabeth Bay.	♂	113	62	40	13.3	6.7	6.7	9	8.3	19.5
4243	" "	"	109	64	40	12.5	6.3	6.5	8.5	8	19
4297	" "	"	128	64	41	13.5	6.5	7	9	8.5	19.7
4300	" "	"	122	62	44	13	6	6.5	9.5	8	18
4217	" "	"	116	65	42.5	12.5	6.5	7	8.5	8	19
4263	" "	"	118	63	39	12		6.5	8	7.5	18.5
4287	" "	"	111	62	39.5	12	6	7	8.5	7.5	18
4209	" "	"	114	63	37.5	12.5	6	6.5	8	8	18.5
4293	" "	"	133	62	40	12.5	6.5	6.7	9	8	19
4357	" "	"	118	65.5	40	12.3	6	7	9	8	19
4323	" "	"	117	64	40	13	6.5	7	8.5	8.5	20
4336	" "	"	115	63	42.5	12	6.3	6.5	8.5	8	19
4303	" "	♀	120	62.5	38	12	6	6.5	8.5	7.3	18.3
4265	" "	"	108	59	35	13	6.5	7	7.5	8.3	18.5
4232	" "	"	110	60	37	12.5	6	6	8	7	19
4285	" "	"	118	62	40	12.5	6.5	6.7	8.7	8	19
4301	" "	"	111	60	44	12	6	6.3	8.3	8	18.3
3938	" Iguana Cove.	♂	120	63.5	40	13	7	7	8.5	8.3	18
4095	" "	"	110	62	38	13	7	7	9	8.5	19.7
4066	" "	"	107	66	45	13.5	6.5	7	8.3	8	21
4084	" "	"	115	64	43	12.7	6.3	7	8.5	8.7	20
4060	" "	"	119	63	39.5	12.3	6.3	6.7	8.5	8	20
4019	" "	"	116	64	44.3	13	6.7	6.7	8.5	9	19
4325	" "	"	123	64	39	12.7	7	6.7	8.5	8.5	18
4338	" "	"	126	63.5	41	12.3	6.5	6	8	8	19
4307	" "	"	115	63	37	13	7.5	7	8.5	8.5	19
3950	" "	♀		67	41	12.3	6.5	7	9.5	8.3	19
4059	" "	"	119	63	41	13	6.7	6.5	8.7	8	19
4056	" "	"	117	60	43	12.5	6.5	7	8.5	8	18
4051	" "	"	107	60	40	13	6.7	6	8	8	20.5
4078	" "	"	114	60	38	12.5	6.7	6	8.7	8	18.5
4063	" "	"	110	62	39.5	13	6.3	7	9	8	19
4057	" "	"	107	60	40	12.3	6.3	6.7	8.5	8	19
4300	" "	"	115	61	34.5	12.5	6.5	6.5	8.5	8.5	20
4330	" "	"	115	57.5	37.5	12.5	6.5	6.5	8.3	8.5	18.5
4009	Narboro.	♂	111	62.5	37.5	12	6.7	7	8.5	8	18
4151	"	"	113	62	42.5	12	6.5	6	8	8	18
4159	"	"	119	62	44	13	6	6.7	8.9	7.7	19
4119	"	"	105	62	40	12.7	6.5	6.5	8.3	8	20
4164	"	"	112	64	40	13	6	6.5	8	8	20
4465	"	"	121	65	36.5	12.7	7	7	8.5	8.5	18.5
4413	"	"	120	62	40	13	6.5	7	7.5	9	18
4460	"	"	122	62	39.5	12	7	7.5	9	8.5	19
4431	"	"	113	65	38.5	14	8.5	7.3	8	9.5	19.3
4449	"	"	128	64	40	14	8.3	6.5	8	9.5	20
4426	"	"	118	63	38	12	6	6.3	6.5	8.3	18.5
4004	"	♀	118	62	42	12.5	6	7	9	8	18.5

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fuliginosa parvula.—Continued.*

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
3885	Narboro.	♀	115	63	41	13	6.7	6.3	8.7	8	19
3988	"	"	118	64	42.5	11	6	6	8.3	7.7	18.5
4440	"	"	112	61	37	13	7	7	7.5	8.5	17.5
4448	"	"	122	64	37	12.3	6.5	7	7	8.5	18.5
4618	South Seymour.	♂	119	63	36	14.3	6.5	6.7	8.7	9	19
4633	" "	"	124	60	39	13.3	7	7	8.5	8.3	19
4645	" "	"	123	65	39.5	13	7	7	8.5	8	19
4678	" "	"	126	65	38	13.5	7	7	9.5	9	18.5
4652	" "	"	124	60.5	38.5	13	6.5	7	7	8	19
4630	" "	"	123	64	39	13.7	7	6.5	8.7	8.7	19.5
4662	" "	"	120	61	40	13.5	6.5	6.5	8.5	8.5	18.5
4639	" "	"	115	63	36.6	12.5	6.5	7	8.5	8	18
4617	" "	"	125	60	39	13	6.3	6.7	9	8.5	19
4677	" "	"	123	62.5	39	13.5		7	8.5	7.5	16
4631	" "	"	117	63	37	12.5	6	7	8.5	8	19
4688	" "	"	123	63	38	13	6.5	6.5	8.7	8.7	20
4699	" "	"	120	64	38	13.5	7	7	9	8.7	19
4636	" "	"	120	62	37	14.3	6.5	7	9.5	8.7	18
4676	" "	"	125	64	38	12.5	6.5	6.7	8.3	8.3	18
4610	" "	"	120	63	36	13.3	6.3	6.5	8.5	8	19
4641	" "	♀	133	60	30	13.7	7	6.7	8.5	8.7	18
4673	" "	"	113	60	38	12	6.5	6.3	8	8.5	17
3899	" "	"	120	60	37.5	13	6.5	6.5	9	8.5	18.5
4611	" "	"	106	59	36	14	7.5	7	8.5	9	18
4697	" "	"	118	59	34.5	13	6.5	6.5	8.5	8.5	18
4657	" "	"	111	60	39	13.3	6.5	7	8.5	8.5	19.5
4651	" "	"	116	58.5	33	13	7	6.7	8	8.5	18
4964	Barrington.	♂	120	60	35	14	7	7	8.7	9	20
4971	"	"	123	63	39.5	13	6.7	6.7	8.5	8.5	18
4970	"	"	119	62	38.5	13	7.5	6.5	8	8.5	18.5
4948	"	"	123	61	37.5	13	6.7	7	9	8.7	18.7
4940	"	"	117	60	38	13	7	6.7	8.5	8.5	18
4944	"	"	113	61.5	37	13	6.5	7	8.7	8	18.5
4946	"	♀	116	59	35	13.7	6.5	6.5	8.3	8.3	19
4937	"	"	116	59.5	37.5	13	6.3	6	7.5	8.5	17.3
4936	"	"	115	58.5	34	12.5	6	6.5	8.5	8	17.5
4698	Indefatigable.	♂	—	60	38	12.7	6	6.5	8.5	8	18
4661	"	"	112	63	38	13	6	6.5	8.5	8.5	19
4663	"	"	116	62	39	13	6.7	6.7	8.5	8.3	19
4706	"	"	120	63	41	12.5	6.3	6.3	8.3	8	19
4671	"	"	120	62	41	13	6.5	6.7	8.5	8	19
4674	"	"	120	62	38.5	12.3	6.3	6.5	8	8	19
4534	James.	"	116	64	44	13.3	7	6.5	8.5	8.5	20
4556	"	♀	112	58	37	12.3	6.3	6.3	7.3	8	19
4507	"	"	116	62	42	14	6.5	6.5	8	9	19.5
4737	Charles.	♂	122	64	38	13.7	7	6.7	8.5	9	20
4881	"	"	—	62	38	12.5	6.5	6.5	8.5	8	18.5
4710	"	♀	120	60	38	12.5	6.5	6.5	8.5	8	18
4731	"	"	110	61	36	12.5	6.7	6.5	8	8.3	19
4885	"	"	120	59	35	13	6.6	6.5	8	8.3	19

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fuliginosa parvula*.—*Continued.*

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4855	Charles.	♀	122	60	42	13.3	7	6.5	8.5	9	18
4866	"	"	120	62	38	12	7	6.5	8.7	8	18
4744	Hood.	♂	120	63	36	13.5	7	7	10	9	18
4716	"	"	—	61	40	13	6.5	6.5	8.5	8.5	18.5
4850	"	"	120	62	39	13.5	7.3	6.5	9	8.5	18.5
4624	Duncan.	"	115	58	35	13	6.5	6.7	9.5	8.3	18
4608	"	"	120	64	39.5	13.3	7	7	9.5	9	19
4714	"	"	117	61.5	36	13	6.3	7	9	8	18
4614	"	♀	116	61	35	12.5	7	6.5	9	8.3	19
4622	"	"	118	56	40	13	7	6.5	8	8.7	18
4730	"	"	123	59	36	13	7	6.3	8	8.5	18

dom included in the nest material. There is no special lining. Some nests have a somewhat finer material on the floor than elsewhere, but the floor is generally more compactly and more solidly formed than the other parts. Three of the nests from Tagus Cove contained eggs — two sets of four each and one set of three. The eggs of set No. 1 have the usual pale greenish-white ground color of all the *Geospiza* eggs, spotted and heavily blotched about the larger end with brownish, vinaceous and rusty-brown, and sparingly spotted with brownish over the rest of the surface. Measurements: 19.5 × 14.5; 19.5 × 14, 19.5 × 14.5; 19 × 14.5. Set No. 2 has the same ground color as the first, but is finely and nearly uniformly spotted with vinaceous so thickly as nearly to obscure the ground color; one of the specimens, however, is spotted only about the large end. Measurements: 19 × 14; 19.5 × 14; 18 × 13.5; 18 × 13.5. Set No. 3, of three eggs, is like the firs tin coloration. Measurements of two specimens: 18.5 × 14.5; 18.5 × 14. These *Geospiza* eggs greatly resemble the eggs of *Spizilla pusilla* but are much larger. Some light-colored eggs of *Junco hyemalis thurberi* are very much like them in coloration.

Several nests and two sets of three eggs were collected at Iguana Cove in the latter part of December. The eggs are like those from Tagus Cove in size and are similar in coloration. One set has a paler ground color and is considerably more spotted with rusty-brown. The nests do not differ from those taken at Tagus Cove.

One set of three eggs was taken at Elizabeth Bay, Albemarle, in February. The eggs of this set are somewhat larger and more ovoid

in shape than any of the specimens taken either at Tagus Cove or Iguana Cove. Measurements: 19.5 × 15; 18.5 × 15; 19 × 15.

The following pairs were taken mated: Nos. 4662–4673, 4633–4657, 4187–4182, 4341–4349, 4400–4359, 4377–4402, 4394–4364, 4403–4401, 4391–4395, 4368–4392, 4408–4409, 4378–4406, 4384–4369, 4389–4367, 4397–4388, 4366–4376, 4325–4308, 4307–4330, 3938–3950.

62*b*. GEOSPIZA FULIGINOSA FULIGINOSA Gould.

Geospiza fuliginosa Gould, Proc. Zool. Soc., p. 5, 1837 (Chatham).
Geospiza parvula Ridgway (not of Gould), Proc. U. S. Nat. Mus., xix, p. 529, 1896.
Geospiza fuliginosa fuliginosa Rothschild and Hartert, Novit. Zool., vi, p. 161, 1899.

Range. — Chatham Island.

In the collection from Chatham Island there are twelve specimens of this species. As a series these differ considerably from the *G. fuliginosa* of other authors from James, Albemarle, Narboro, Indefatigable, Duncan, Charles, Barrington and Hood. The bill is longer and more slender with the basal depth about the same and the wing averaging slightly larger. Two of the specimens are scarcely distinguishable in shape and size of bill from *G. f. acutirostris*. This form approaches closely in size of bill to *G. dentirostris* but the wing is considerably less than sixty-eight millimeters.

This species was found abundantly on Chatham in May and generally distributed. The song consists of two notes, *zēē' ŭrr*, repeated twice.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fuliginosa fuliginosa*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4717	Chatham.	♂	127	64	41	13.5	7	6.7	9	8.7	18.5
4829	"	"	126	65	39	14	7	6.5	8.5	8.5	19.5
4821	"	"	120	64	41	14	7	7	9	9	19.7
4856	"	"	128	65	42.5	14.5	8	7	9.7	9.7	20
4714	"	♀	116	59	36	12.3	6.5	6	7.5	7.5	17.5
4786	"	"	117	62	36	12.5	6.5	6.5	8.5	8	17
4715	"	"	122	60	36	14	7.5	6.5	8.7	9	19.5
4895	"	"	120	63	37	14.5	7.5	7	8.5	10	19
4749	"	"	120	60	—	13	7.3	6.5	9	9	19

62*c*. GEOSPIZA FULIGINOSA MINOR Rothschild and Hartert.

Geospiza fuliginosa minor ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 162, 1899.

Geospiza fuliginosa SALVIN, Trans. Zool. Soc., IX, p. 483, 1876 (part). — SHARPE, Cat. Birds Brit. Mus., XII, p. 13, 1888. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, pp. 526, 529, 1896 (part).

Range. — Abingdon and Bindloe.

Similar to *G. f. parvula*, but averaging smaller, wing usually less than sixty millimeters, culmen about twelve and one half.

This variety is common on both Abingdon and Bindloe. It occurs everywhere on Bindloe which is comparatively low, but on Abingdon it was found only below eight hundred feet altitude, Abingdon reaching an elevation of nineteen hundred feet.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fuliginosa minor*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
5254	Abingdon.	♂	102	55.5	34	12.7	7	7	8.5	8.5	18
5195	"	"	114	58	30.5	12.3	6	6	7.5	7.5	18
5158	"	"	110	58	36	13	6.7	6.5	8	8	18.3
5117	Bindloe.	"	115	56.5	36	12	6.5	—	7	8	18
5128	"	"	117	55	35	12.5	7	6	7	8.7	18
5165	"	"	111	58.5	35	12.5	6.3	6.3	7.5	8	18

62*d*. GEOSPIZA FULIGINOSA ACUTIROSTRIS (Ridgway).

Geospiza acutirostris RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 363, 1894, and XIX, p. 531, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 506, 1901. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 162, 1899.

Range. — Tower Island.

Very similar to *G. f. fuliginosa*, but bill more acute, with straighter outlines; the culmen averaging fourteen and one half millimeters and the basal depth eight and one half millimeters. Our birds, which were taken in June, all have pinkish-horn-colored bills, but are apparently adult.

This is the most common *Geospiza* on Tower, where it occurs abundantly near the coast, frequenting the cactus (*Opuntia*) thickets.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fuliginosa acutirostris*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
5292	Tower.	♂	118	61	39	14	7.5	6.5	8.5	9.3	18
5189	"	"	115	63	42	13	7	6.3	8.7	9	18
5169	"	"	115	62	40	14.5	7.3	7	8.5	9.3	17.5
5157	"	"	120	61.5	38	15	8	6.5	8	10	17
5291	"	"	123	66	43	15	8	6.5	8	9.7	19.5
5182	"	"	121	63.5	41	15	8.5	7	9	10	19
5176	"	"	111	59.5	40	14	7	7	8.3	8.7	18
5133	"	♀	110	59	38	13	7.3	6	8	9	17.5
5265	"	"	115	60	40	14	7.7	6.5	8.5	9.3	17

62*e*. GEOSPIZA FULIGINOSA DIFFICILIS (Sharpe).

Geospiza difficilis SHARPE, Cat. Birds Brit. Mus., XII, p. 12, 1888.—RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 532, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 507, 1901.—ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 163, 1899.

Range. — Abingdon Island.

This form is very close to *G. f. acutirostris* of Tower, from which it differs in the slightly larger bill. Some of our specimens, however, are quite indistinguishable from specimens of *G. f. acutirostris* and we have, hence, united this form with the *fuliginosa* group. This gives *two subspecies* of *G. fuliginosa* to Abingdon, but *G. f. difficilis* is quite distinct from *G. f. minor*. This latter species, also, as before stated, inhabits only the lower parts of the island, ranging from sea level up to about eight hundred feet. *G. f. difficilis*, on the other hand, appears to be restricted to the higher parts of the island, where it is common. It was the only form seen above fifteen hundred feet, and it was here most abundant, while below five hundred feet it was not met with at all.

This is one of the few forms that occur on Abingdon but not on Bindloe. Perhaps the lesser height of the latter island, which does not reach an altitude greater than eight hundred feet, accounts for the restriction of this species to Abingdon.

We must now make a break in the series which leads on uninterruptedly from the form last described through *G. debilirostris* and *G. septentrionalis* to the forms comprising the next and highest subgenus, *Cactornis*. We do this in order to go back again to *G. fuliginosa parvula* and insert another series which begins with *G. fortis* and

leads up to the largest billed forms of *Geospiza*, viz., *G. strenua* and *G. magnirostris*, but which in plumage are more generalized than the members of the *Cactornis* group. It was only for the conventionality of placing all the varieties of a species in continuous succession that we did not insert the *G. fortis magnirostris* series immediately after *G. fuliginosa parvula*.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fuliginosa difficilis*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
5216	Abingdon.	♂	128	61	36	15.3	7.7	7	9	9.5	20.5
5279	"	"	118	63	33.5	14.7	8	7	9	9.7	20
5254	"	"	130	62	39	15.5	—	6.5	8	10	20
5192	"	"	120	59	35	15.5	8	7.5	9	9.7	19.5

63. THE GEOSPIZA FORTIS SERIES.

Under this series we include forms that have by Ridgway and Rothschild been kept separate in two groups, *G. fortis* and *G. dubia*. We have specimens from the southern end of Albemarle at Iguana Cove that absolutely bridge over the differences between the previously known forms of these two supposed species. These Iguana Cove specimens we have described as a new subspecies, *G. fortis platyrhyncha*. This grouping of all the forms heretofore separated into the species *fortis* and *dubia* leads us into the necessity of recognizing two subspecies of the same species on the same island wherever the two forms occur. There are four cases of this sort: *G. f. fortis* and *G. f. dubia* occur together on both Chatham and Duncan; *G. f. fortis* and *G. f. bauri* occur on James; *G. f. fortis* and *G. f. simillima* occur on Charles. *G. f. simillima* Rothschild and Hartert is a variety of very doubtful standing, but the other three cases are apparently well substantiated. On these islands when two subspecies of *G. fortis* occur together in this manner, the two forms are always entirely distinct, and intergrade as subspecies only through individuals on some other island. On Albemarle where two subspecies occur they are geographically separated and intergrade on the intermediate territory just as do subspecies inhabiting contiguous areas on the mainland. It may of course be questioned whether groups of individuals living on different islands and showing some average difference as

groups, but yet intergrading in their variations, should not be regarded as true species, since these intergradations are evidently due to overlaps in individual variation and not to interbreeding, on account of their isolation on the different islands. This is a point that we do not attempt to discuss, and simply follow the conventional canons of the A. O. U. nomenclature.

Geospiza fortis as a species, including all the *fortis* varieties, has its bill variation confined within the following limits in mature birds: Length of culmen, 15 to 20; depth of bill at base, 11 to 16; width of bill at base, 8 to 12. In both length of the culmen and width of the bill at the base it intergrades with *G. fuliginosa*, but there is a constant difference in the depth of the bill, the greatest basal depth in *G. fuliginosa* being 9.5.

Subspecies at the lower end of the *G. fortis* series have the bill shaped exactly like that of *G. fuliginosa parvula;* those at the upper end have bills of a proportionally greater depth and with a rounded culmen.

63*a*. GEOSPIZA FORTIS FORTIS (Gould).

Geospiza fortis GOULD, Proc. Zool. Soc. Lond., p. 5, 1837. — Zool. Voy. Beagle, III, Birds, p. 101, pl. 38 (Charles Island). — SALVIN, Trans. Zool. Soc. Lond., IX, p. 481, pl. 9, 1876. — SHARPE, Cat. Birds Brit. Mus., XII, p. 10 (in part). — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 521, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 502, 1901.

Geospiza nebulosa GOULD, Proc. Zool. Soc. Lond., p. 5, 1837. — SHARPE, Cat. Birds Brit. Mus., XII, p. 11 (in part).

Geospiza albemarlei RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 362, 1894; Bull. U. S. Nat. Mus., 50 Pt. I, p. 502, 1901.

Geospiza dubia albemarlei ROTHSCHILD AND HARTERT, Nov. Zool., VI, p. 160, 1899.

Geospiza fortis fortis ROTHSCHILD AND HARTERT, Nov. Zool., VI, p. 161, 1899.

Range. — Charles, Gardner (near Charles), Chatham, Indefatigable, Seymour, Duncan, Jervis, James, Albemarle (Tagus Cove) and Narboro.

This form presents the least departure from *Geospiza fuliginosa fuliginosa*. In shape and size of the bill it is intermediate between *G. f. fuliginosa* and *G. f. dubia* of the upper end of the *G. fortis* series. Adults of *G. fortis fortis* and *G. fuliginosa* are always distinguishable by the larger bill of the former, but young birds of *G. fortis* have bills almost exactly duplicating those of adults of *G. fuliginosa*. We have examined young specimens which in fact could not be definitely assigned to either species.

Ridgway has described specimens from Albemarle as *Geospiza albemarlei*. His specimens probably came from either Tagus Cove

or the southeast part of Albemarle, for these are the only localities that collectors up to that time had visited. Specimens from Tagus Cove do not differ from specimens of *G. fortis fortis* of the other islands. Some of those from southeast Albemarle have rather longer and deeper bills, but they grade into *G. fortis platyrhyncha* of Iguana Cove at the southwest end of Albemarle. Hence there are two varieties on Albemarle, but these are *G. f. fortis* and *G. f. platycephala*. If the *type* of *G. albemarlei* had come from Iguana Cove, then this name could be retained.

Our specimens of this species are from Charles, Chatham, James, Indefatigable, Seymour, Albemarle and Narboro. The species was found most abundant on Charles, James, Albemarle and Narboro.

We have twenty two specimens of adult males taken at Tagus Cove in January, February and March. They are in Stages III to VI. There are two in Stage III, taken in March; two in Stage IV, taken in January and one taken in March; four in Stage V, taken in March and one taken in January; and six in Stage VI, taken in January, one taken in February and four taken in March.

Adult Males. — Coloration almost exactly the same as in *Geospiza fuliginosa parvula*. Deep black everywhere except on the wings and tail, which have a brownish tone.* Under tail coverts bordered with white. In some there is a varying amount of grayish color on the posterior part of the belly and on the flanks as pale edgings to the feathers; in such cases the entire exposed parts of the under tail coverts are gray. This pale color generally lacks the buffy tinge present in *G. fuliginosa*. Bill black. Feet brown.

The same plumage stages are distinguishable as in *G. fuliginosa*, but all the specimens except one, even down to those in Stage III, have the bill entirely black. One specimen intermediate between Stages V and VI, however, has the lower mandible yellow with black only on the sides of the base and at the base of the gonys. There is in no stage any buffy tinge to the pale parts of the plumage, a mark distinguishing the species from *G. fuliginosa*. There are only three young males in the collection taken in January; two of these are in Stage IV, one has yellow on the lower mandible; the other is in Stage V. March birds are in Stages III to VI. The yellow-billed January bird has a few new feathers coming in on the back and breast; the other January specimens are not moulting. None of the March birds are moulting.

The males of this species apparently are longer in acquiring the black plumage than are the males of *G. fuliginosa*. The bill becomes

black by the beginning of the breeding season, but the plumage does not. The species nests at Tagus Cove in March. Several pairs of mated birds were secured at this time, and many others observed, of which the males were in immature plumage, some scarcely distinguishable from the females. In fact, the number of mated black billed males in immature plumage nearly equalled the number of mated males in black plumage.

Adult Females. — We have three adult females taken in January, one taken in February and three taken in March. The bills are not as dark as in the males. The upper mandible is dusky or brownish-black, while the lower is generally still paler. One of these females is moulting; it is a March bird with entirely dark bill and was taken mated with an adult male.

Immature Females. — There are eight immature females in the collection, all taken in January. They have yellow or partly yellow bills. The plumage in some is the same as that of the adult females, but it varies from this to much paler, where the brown is not nearly so conspicuous. Since no yellow-billed specimens were taken in March, it appears that they acquire the dusky bill before this month, probably in February. Nearly all of the young females are moulting, but the new feathers are most numerous and conspicuous in the paler plumaged birds. The absolute amount of brown color on the feathers of the adult females and the darker immature ones is much greater than on the feathers of the paler younger birds, so that the moult must be accompanied by a change in the color of the feathers.

Specimens from Narboro do not differ in the form of the bill from those taken at Tagus Cove on Albemarle. The collection contains four adult males in black plumage with black bills, taken in April on the east side of the island. There are four males in black plumage, taken in January on the north side of the island, that present the following very unusual coloration of the bill for birds in black plumage in January: the upper mandible in all four is brownish-horn, in two the lower mandible is light horn-yellow with dusky tip; in the other two the lower mandible is mostly the color of the upper, but is yellow at the base. These birds must either have been very late in acquiring the black bills, or else precocious in attaining the black plumage. One of these black, yellow-billed birds is moulting.

There are seven specimens taken on Seymour and the adjoining part of Indefatigable, during the last of April and the first of May. One specimen is an adult male in purely black plumage and with a black bill. Two are brown-backed males with much pale color on

the edges of the feathers of the belly. The occurrence of these forms after the breeding season would indicate that the purely black plumage is not acquired until during the second year. Another specimen is a male in Stage V, and another a male in Stage IV. Both of these have black bills and are moulting. There is one adult female with a black bill, and finally one young bird in Stage II with a yellow bill. These specimens indicate the same thing concerning the acquisition of black as do the specimens from Tagus Cove, Albemarle, viz., that the bills of the males are nearly always black by the breeding season, but that the plumage may be only in Stages V or IV.

We have twenty specimens of *Geospiza fortis* from James Island, taken in April about James Bay. All of them apparently belong to the subspecies *G. f. fortis*, being the same as those at Tagus Cove. We have no specimens from James that we could identify as *G. f. bauri*. Nine of the specimens are adult males, all having black bills, but some are in the black phase of Stage VI and others in the brownish. Several in each phase are moulting. One male in Stage V and two in Stage IV are each moulting slightly, all having black bills. Three are adult females, one with a black bill, two with the bill dusky above and paler brownish beneath. Five are young birds but recently from the nest, all in Stage II with yellow bills and soft plumage, and all are moulting.

From Charles there are in the collection twelve specimens taken in May. Eleven of them clearly belong to the subspecies *G. f. fortis*. One, however, an immature male with the lower mandible yellow, has a bill much larger than that of the others and resembling the bill of *G. fortis dubia* of Chatham. This specimen may perhaps be *G. fortis simillima* (Rothschild and Hartert). Five of the Charles specimens are adult males; two are immature males in Stage IV; four are adult females; and one is an immature female, having the lower mandible yellow and a few new feathers growing in.

Habits, Song, Nests and Eggs. — At Tagus Cove, Albemarle, *Geospiza fortis fortis* was found fairly abundant, associating with *G. fuliginosa parvula*, but was always much less numerous than this species. The songs of the two were different but not radically so, being often very similar, and were always constructed on the same plan. One song consisted of two syllables of which the first had an *ê*-sound (thêre) and was much prolonged by a sort of *r*-like trill, while the second had a long *e* sound and carried the accent. The song may be represented thus: *têr-r-r-r-wee'*, *têr-r-r-r-wee'*. The birds were singing but little at this time, and were very scarce in the mangrove swamps about Turtle Point.

During March the birds at Tagus Cove were nesting and the males were singing much more than in January. A common song at this time resembled *teur'-wee-wee*, *teur'-wee-wee*, *teur'-wee-wee*. The accent was always conspicuously placed on the first syllable in each set. Often all these notes resembled the first, or this was only slightly different from the other two. In this case the song much resembled that of the Elizabeth Bay *Geospiza heliobates*. This song, having all the notes nearly alike, was connected by numerous intermediate varieties with the other. They sang also a bisyllabic song resembling *twĕr-twĕr*, *twĕr-twĕr*. This was much like the song of the *Geospiza heliobates* of the Narboro and Turtle Point swamps. The vowel sound, however, differed noticeably in the two, that of the former lacking the pure *ër* sound of the latter.

About the middle of March *Geospiza fortis fortis* was found rather numerous in the mangrove swamp north of Tagus hill. They were continually singing a song sounding like *tee'-wër-wër*, *tee'-wër-wër*, *tee'-wër-wër*. Nearly always three sets were uttered in succession. We shot a male that was uttering the sound almost continually, and flying all the time from tree to tree ranging back and forth over a considerable area. Others were heard doing the same. They varied the vowel sound of the syllables so much that often the first had the sound of the second and third and these two the sound of the first, thus: *tür-wee-wee*. Sometimes, especially when the bird observed was at a considerable distance, all three syllables had the *ë* or *ü* sound, and then the song much resembled the song of the *G. heliobates* at Elizabeth Bay. In such cases, however, the initial consonant sound of the first syllable is generally different from that of the second and third syllables, thus: *tür'-wür-wür*, *tür'-wür-wür*, *tür'-wür-wür*.

During March a mated pair of these birds selected an acacia bush in the small canyon at the head of Tagus Cove as their home for that season. The male constructed the nest, the female taking no part in the actual labor; but she frequently came about while the nest was being built, apparently to inspect and approve or disapprove of the work of her partner. The latter never worked hard at the nest but spent most of his time flying excitedly about and singing, working only occasionally. Whenever the female came to the nest he quit work entirely to remain near her and to fly about with her. This pair was observed for a number of days and at all times during the morning. The male whenever heard sang the same thing, a song which may be represented as follows: *zee''u-twee''u*. The difference between the initial consonants of the two parts was very marked and scarcely

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fortis fortis*.

Cat. No. Stan Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4201	Albemarle, Tagus Cove.	♂	137	73	49	17	8.5	9.5	13	11.5	21
4006	" " "	"	138	75	49	18.5	10	9.7	14	12	21
3980	" " "	"	125	68	48	17.5	9	9.7	12.5	12	20.5
3978	" " "	"	132	70	42	16.5	8.5	9.5	13	11	20.5
4132	" " "	"	131	71	49	17	8.5	10	13.5	11.5	21
4294	" " "	"	135	72	42.5	18	9.5	10.3	14.5	12	23
4322	" " "	"	142	74	44	17	9	9.5	13.3	12	22
4208	" " "	"	140	75	44	18	9.5	10.3	13.5	12.5	22.5
4039	" " "	"	115	71	41	17.7	9.7	9.7	13	12	22
4393	" " "	"	118	70	39	16.5	—	9	12	11	21.5
4371	" " "	"	127	70	43	17.5	9	9.5	12	12	21.5
4176	" " "	"	117	66	39	16	8	8.3	11	10.5	20
4407	" " "	♀	138	71	42	18.5	9.5	11	14	13	21
4133	" " "	"	128	66	39	15.7	8.5	8.5	11.5	10.5	20
4142	" " "	"	127	68.5	44	17	8.3	9	14	11	22
4181	" " "	"	118	67	38.5	16.7	8.5	8.7	12	11.5	20.7
3958	" " "	"	125	70	42	19	10	11	14	12.3	23
4028	" " "	"	128	72	49	18.5	9	10	13	12.5	20.5
4147	" " "	"	127	68	49	17	8.7	9.3	12.3	11.7	21.5
4390	" " "	"	131	65	40	16	8.5	9	12	11	20
4387	" " "	"	120	64	34	16	8	9	11	11	21
4370	" " "	"	118	65	38.5	16.5	8.5	8.5	11.3	11	20
4264	" " "	"	120	66	40	15	8.5	8.3	11.5	10	19.5
4463	Narboro.	♂	136	70.5	41.5	16.5	8.5	10	12.5	12	19.7
4419	"	"	133	71	42.5	16.5	9	10	13	11.5	20.5
4459	"	"	140	72.5	44	17	10	9.7	13	12	21
4440	"	"	122	66	38	16.5	9	9.5	12	11.5	21.3
3933	"	"	131	70	42	16.7	9	9.7	12.5	11	20
3971	"	"	130	72	43	16.7	8.5	9.3	12	11.3	21
4006	"	"	130	73	42	17	8.5	9.5	12.5	11.5	21
3952	"	"	133	70	44	17	9	9.5	11.7	11.3	20.5
4464	"	"	139	69	38	17	9.5	10.3	13.5	12	18.5
4870	Charles.	"	135	68.5	43	16.5	9	9.3	13	11	20
4833	"	"	130	69	41.5	16	8	8.5	11	10.5	19
4722	"	"	140	73	43	16.7	8.7	9.5	12	11	21.5
4717	"	"	134	70	40	17	8.5	9.7	12	11	20.5
4892	"	♀	136	70	43	17	8.5	9.5	13	11	21
4725	"	"	128	67	40	16	8	8.7	11.5	10.5	19
4723	"	"	130	66	40	16	8.3	8.5	11.5	10.5	20.5
4878	"	"	—	68	43	17.7	9.3	9.7	13	12	19.5
4867	"	"	139	73	42	18	9.7	9.5	13.3	12	20
4702	Indefatigable.	♂	130	70	43	17	9	9	12.5	11	20.5
4707	"	"	131	69	35	17.5	9	10	12.7	12.5	21.5
4667	"	"	132	68	41.5	17	8.7	8.7	12.3	11.5	20
4644	South Seymour.	♀	135	68	39	17	9	9.5	12	11.3	20.5
4601	James.	♂	128	70	40	17	9	10	13	11	21.5
4535	"	"	135	72	44	18	9.3	10	13.3	11.5	21
4476	"	"	124	70	42	17.5	9	10	13	11.5	21.5
4510	"	"	128	74	44	17	8.5	9.5	12.3	11	22
4501	"	"	134	71	44	16	8.3	9	12.5	10.7	21

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fortis fortis*.—*Continued*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4458	James.	♂	122	73	44	18.5	10	10	14	12.5	20.5
4506	"	"	123	71.5	50	16	8	8.3	11	10	20
4504	"	"	133	70.5	46	18	9	10	12.5	11	21
4503	"	♀	123	67	41	16	8.5	8.7	11	11	20.3
4515	"	"	120	68	45	17	9	9	12.3	11.3	20
4555	"	"	133	67	45	16.5	8.3	9.5	12.5	10.7	22

ever did the bird make any variation. Another male bird of the same species was observed flying about in the neighborhood of a tree in which was a large *Geospiza* nest with eggs uttering continually these same notes. No female, however, was ever to be seen about or in the nest and the eggs were always cold so she had probably been killed, yet the male remained in the neighborhood singing as if the female were still on the nest.

During March a bird at Tagus Cove was heard singing *tee'up-twee'u*.

At Iguana Cove in December one bird was observed singing a song resembling *twee'-ur'r'r*, *twee'-ur'r'r*. This was uttered generally twice in succession, often only once, sometimes three times. (The representatives of the species at Iguana Cove belong to the subspecies *G. f. platyrhyncha*.)

On James Island about James Bay the relative numbers of *Geospiza fuliginosa parvula* and *G. fortis fortis* were just the reverse of what they were at Tagus Cove, Albemarle. Here on James the *G. fortis* was the commonest species of *Geospiza*. Their song very much resembled the common song of the individuals at Tagus Cove, sounding somewhat like *teu'-we*, *teu'-we*.

On Charles Island one song of *Geospiza fortis fortis* almost exactly resembled the song of *G. fuliginosa parvula* of Tagus Cove. The accent was always on the first syllable and may be represented thus: *teur'-wee*, *teur'-wee* — no difference was noticed that could be described by alphabetical sounds. The same birds, however, sang numerous different songs.

Two nests collected at Tagus Cove in March were placed in bushes, and are of the same shape as the nests of *G. fuliginosa* described. Both were composed almost wholly of grasses, but were very

unequal in size. One was about the size of an ordinary *G. fuliginosa parvula* nest, the other was much larger, larger even than the nest of *G. strenua*.

In the smaller nest were four eggs. These do not differ, except in their larger size, from eggs of *G. fuliginosa parvula*. The ground color is pale greenish-white, finely spotted with brownish and vinaceous, the spots forming blotches about the larger end. They measure as follows: 21 × 16.5; 21 × 16; 21 × 16; 21 × 16.

The following pairs were taken mated: Nos. 4371–4390, 4361–4407, 4373–4387, 4503–4503.

63*b*. GEOSPIZA FORTIS FRATERCULA (Ridgway).

Geospiza fratercula Ridgway, Proc. U. S. Nat. Mus., xvii, p. 363, 1894, and xix, p. 525, 1896; Bull. U. S. Nat. Mus., 50, Pt. 1, p. 504, 1901.
Geospiza fortis fratercula Rothschild and Hartert, Novit. Zool., vi, p. 161, 1899.

Range. — Abingdon and Bindloe.

Our series of specimens of this subspecies from Abingdon and Bindloe show no difference in the shape or size of the bill from specimens of typical *G. f. fortis* from Charles. The wing, however, averages smaller and the body is smaller in proportion to the size of the bill than in *G. f. fortis* and these appear to be the only distinguishing characters of this form.

MEASUREMENTS OF *Geospiza fortis fratercula*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
5203	Abingdon.	Ad. ♂	133	64	41	18	9	10.5	13	12	19
5073	"	"	133	65	40	16.5	9	9	11.5	11	19
5245	"	Im.	141	71	44.5	18	10	11	14	12.7	20.5
5222	"	"	121	63.5	40	16.5	8.7	9	11	11	18.5
5256	Bindloe.	Ad. ♂	128	67	38.5	18	9	9	12.5	12	18.5
5223	"	"	115	64	40	17	8.5	9.7	13	11.5	18.7
5184	"	"	120	65	37	17.5	9	9	12	11.5	20
5151	"	Im.	125	67	39.5	17.5	9	9.5	12	12	19
4724	"	Ad. ♀	122	60	37	16.7	8.3	9.3	12	12	18.5
5118	"	"	128	62	37	16	8.3	9.3	12	11	18.5

Found in June fairly common on Bindloe, but less abundant on Abingdon, where nearly all seen were young birds of the same year. There is no difference between the specimens from the two islands. The collection contains five adult males in either black or black and

brownish plumage. Four have black feathers on the back with an admixture of brownish feathers, *i. e.*, the individual feathers are either purely black or brown. They are all moulting. Hence, it appears that here, at least, in June a moult occurs in which the brownish-black plumage is lost and the black acquired. We have one male in Stage V with the bill black, another with the bill black above and pale below, one in Stage III with the bill entirely pale. All of these are moulting. Two males in Stage IV, having the bills mostly pale but partly dusky above, are not moulting.

63*c*. GEOSPIZA FORTIS PLATYRHYNCHA

Heller and Snodgrass.

Geospiza fortis platyrhyncha HELLER AND SNODGRASS, The Condor, Vol. III, No. 3, May-June, p. 75, 1901 (Iguana Cove, Albemarle Island).
Geospiza platyrhyncha RIDGWAY, Bull. U. S. Nat. Mus., 50, Pt. 1, p. 673, 1901.

Range. — Iguana Cove, Albemarle.

This form is similar in size and proportions to *G. fortis dubia*, but the bill averages considerably wider at the base, being twelve millimeters or more in width. The variety intergrades through forms at the southeastern part of Albemarle and at Elizabeth Bay with *G. fortis fortis* at Tagus Cove.

It was not common at Iguana Cove either in January, March or June. We have three adult males taken in January and March in black plumage having very large thick bills with curved culmens, and two females, one adult taken in March, the other taken in December. The latter has the bill yellowish below and was moulting. The ovaries were enlarged, however, as if the bird was breeding.

Type. — Adult male, No. 5150 Leland Stanford Junior University Museum; Iguana Cove, Albemarle, Galapagos, June 7, 1899.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fortis platyrhyncha*.

Cat. No. Stan. Univ. Mus.	Locality.		Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4355	Albemarle,	Iguana Cove.	♂	151	77.5	46.5	19	10.5	12.5	16	13	22
4351	"	"	"	148	76	44	18	9.5	12.5	15	13	23
5150	"	"	"	147	75	46	18.5	9	12	16	13	22
4352	"	"	♀	142	74.5	43.5	18.5	9.7	12	15	13	22
4048	"	"	"		71	45	18	9.5	12	15.5	12.7	21.5

We have examined seven specimens of *Geospiza fortis* from the southeastern part of Albemarle at Villa Mil, in a collection belonging to Captain W. Johnson, of San Francisco, collected by Mr. G. M. Green, of San Francisco. The bills of these specimens vary from the *G. f. platyrhyncha* type to that of *G. f. fortis*. The following are measurements made on these specimens:

Locality.	Sex.	Wing.	Culmen.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.
Albemarle, Villa Mil.	♂	78	19	12	15	13
" "	"	71	16	10	12	12
" "	"	74	18	10	14	12
" "	"	73	19	12	15	13
" "	"	74	16	10	13	11
" "	♀	72	17	10.5	14	12
" "	"	72	18	10	14	13

There are in our collection seven specimens of *Geospiza fortis* from Elizabeth Bay, Albemarle. These resemble the Villa Mil specimens in presenting a great deal of variation. Some have bills as large as those of typical *G. f. platyrhyncha* specimens with strongly curved culmens; others are indistinguishable from ordinary *G. f. fortis* specimens. The following are measurements of the Elizabeth Bay specimens:

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4244	Albemarle, Elizabeth Bay.	♂	125	73	47	19	10	11	14.5	12.5	22
4346	" " "	"	137	74	48	17.5	10	11	15.5	13	21.5
	" " "	"	146	74	47	18.5	10	10.3	15.5	12.5	21.7
4290	" " "	"	130	68.5	38	17	9.5	10	13.5	12.5	21.5
4295	" " "	"	136	73	45	16.7	8.3	9	12.3	10.7	21.5
4298	" " "	"	136	69	42	16	8	8	11.5	10.7	21
4296	" " "	♀	140	72	41.5	17	9	9.5	12.5	11.5	21.5

These specimens undoubtedly bridge over the difference between the former species *G. fortis* and *G. dubia*.

63*d*. GEOSPIZA FORTIS DUBIA (Gould).

Geospiza dubia GOULD, Proc. Zool. Soc. Lond., v, p. 6, 1837. — RIDGWAY, Proc. U. S. Mat. Mus., XIX, p. 518, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 501, 1901.

Geospiza dubia dubia ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 160, 1899.

Range. — Chatham, Barrington and Duncan.

The bill of this form is shaped much like that of *Geospiza strenua*, being the longest of all the *G. fortis* bills except *G. f. bauri*, and has a strongly curved culmen.

All of the specimens of *G. fortis* that we obtained on Chatham belong to this variety, although *G. f. fortis* is recorded from Chatham by Rothschild and Hartert. We have four adult males, one adult female and two immature males taken in May. The immature males are in Stage IV; each is moulting slightly.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza fortis dubia*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
4790	Chatham.	♂	134	73	42.5	18.3	9.5	11	15	12.5	22
4894	"	"	138	77	46.5	19	10	11.5	15.5	13	22
4760	"	"	153	75	46	19	10	11.5	16.3	13	23.7
4851	"	"	150	76	48	18	10.3	10.7	14	12.5	22
	"	"	145	71	44.5	18.3	9.5	11.3	15	13	23
4712	"	♀	140	68	41	18	9.5	11	14	11.7	22.5

63*e*. GEOSPIZA FORTIS SIMILLIMA (Rothschild and Hartert).

Geospiza dubia simillima ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 161, 1899 (Charles Island).

Geospiza simillima RIDGWAY, Bull. U. S. Nat. Mus., No. 50, Pt. I, p. 502, 1901.

Range. — Charles Island.

This form is described by Rothschild and Hartert from one adult male and four immature birds as differing from *G. f. fortis* of Albemarle (comparisons probably made with specimens from Villa Mil at the southeast part of Albemarle) in having the wing from two to three millimeters longer. If this is a valid species really different from *G. f. fortis* on Charles, we have one immature male that is probably referable to it. This specimen measures as follows: length 130; wing 75; tail 49; culmen 20; gonys 10; basal width of bill 11, basal depth of bill 15.5; maxilla from nostril 13; tarsus 22. It was taken in May and is moulting.

63*f*. GEOSPIZA FORTIS BAURI (Ridgway).

Geospiza bauri RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 362, 1894 (James Island), and XIX, p. 518, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, p. 500, 1901.

Geospiza dubia bauri ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 161, 1899.

Range. — James Island.

This variety is known only from three specimens taken on James Island by Baur and Adams. We have not seen specimens of it. According to Rothschild and Hartert, who examined Baur and Adams' specimens, it is subspecifically related to *G. fortis dubia*, differing from the latter only in having a larger beak. It, then, possesses the largest bill of the *G. fortis* series, approaching nearest to *G. strenua*.

64. GEOSPIZA DARWINI Rothschild and Hartert.

Geospiza darwini ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 158, 1899 (Culpepper Island).—RIDGWAY, Bull. U. S. Nat. Mus., 50, Pt. I, p. 500, 1901.

Range. — Culpepper Island.

We did not procure any specimens of this form. The measurements of the beak given by Rothschild and Hartert are included within the dimensions of the bill of *G. strenua*. The adult male differs, however, from that of *G. conirostris*, *G. strenua* and *G. magnirostis*, according to the describers, in having the "feathers of the breast, abdomen and back slightly edged with olive" and in having the rump conspicuously olive. "Bill compressed and rounded, as in *G. conirostris*, but, unlike the other species of *Geospiza*, abruptly narrowed three millimeters from the tip and elongated sharply to the point."

65. GEOSPIZA STRENUA Gould.

Geospiza strenua GOULD, Proc. Zool. Soc. Lond., p. 5, 1837, and Zool. Voy. Beagle, III, Birds, p. 100, pl. 37, 1841. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 155, 1899. — RIDGWAY, Bull. U. S. Nat. Mus., 50, Pt. I, p. 496, 1901.

Geospiza pachyrhyncha RIDGWAY, Proc. U. S. Nat. Mus., XVIII, p. 293, 1896 (Tower Island); Bull. U. S. Nat. Mus., 50, Pt. I, p. 498, 1901.

Range. — James, Bindloe, Abingdon, Tower, Indefatigable, Jervis, Duncan, Barrington, Albemarle, Narboro and Wenman.

Our collection contains one adult male and one adult female from Narboro, taken in January and March; five adult males and one adult female taken on James in April; and nine adult males and three adult females taken on Abingdon, Bindloe and Tower in June. Besides the adults there are numerous young specimens from James, Abingdon, Bindloe and Tower.

The adult males are exactly the same in plumage as adult males of *G. fuliginosa* and *G. fortis*. The specimens are all moulting except those taken on James in April. They were taken on Narboro

in April and on Abingdon, Bindloe and Tower in June. This shows that with the adults there is a moult after the breeding season.

The adult females resemble those of *G. fuliginosa* and *G. fortis* in color of plumage, but the bill is generally more or less pale below. Females taken in April and June are moulting; the one taken on Narboro in March is not.

All of the young birds in the collection except one were taken in June. All of these, except one male from Tower, are in Stage II. The one that is not is in a condition between Stages IV and V; the upper mandible is black; the lower mandible is black on the sides, yellowish below. One young female from Narboro was taken in January. It has the plumage of the adult, but the lower mandible is pinkish-yellow.

A nest of this species containing a set of five eggs was secured on Narboro April 5. It was placed a few feet above the ground in the forks of a small bush. In shape it resembles the nests of other *Geospizæ* already described. It is composed exteriorly of plant stems interwoven with lichens and a few grasses, and is lined scantily with bark fibers, finer grasses and a few lichens. The height of the nest is one hundred and fifty millimeters, its width one hundred and sixty, the depth of the interior one hundred and twenty, and the diameter of the entrance five.

The eggs have a pale greenish-white ground color, with a few grayish shell marks and numerous brownish blotches, heaviest about the larger end. Dimensions: 23 × 17.5, 23 × 17, 23.5 × 17, 23.5 × 17, 23.5 × 17.

The song of this species was not often heard. One bird was observed singing at James Bay on James Island. The song had a very pleasing sound, differing considerably from the ordinary *Geospiza* notes. It may be represented as follows: *teu'w.....ē.....ē-leur*. The first greatly prolonged syllable was indistinctly divided into two parts, the second one with the *ē*-sound being the part specially prolonged. The sound of the first syllable was smooth and continuous, but the second syllable was abruptly different from the preceding. It was slightly prolonged, had a very pure tone, and ended with a rising inflection.

The following table shows that the specimens from Narboro have a somewhat smaller bill and smaller wing than most of the others. More specimens from this island might indicate a separate subspecies for Narboro.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza strenua*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
5168	Tower.	♂	170	86	55	24.5	12.5	16	22	17	23.5
5226	"	"	162	84	51	25.5	13.5	16	22	17	25
5243	"	"	160	86	53	24.5	12.5	16.5	21.5	16	24
5239	"	♀	155	81	50	25.5	13	17	22	16.5	23
5213	"	"	172	87	57	24.5	13	16.3	22	17	25
4590	James.	♂	160	82	51	23.3	12	15	20	15.7	24
4516	"	"	160	86	52	24	11.5	15.5	21	16	25
4511	"	"	162	85	50	23	11.5	15.5	21	15.7	25
4580	"	"	158	85	52	25	12.5	15.5	22.5	17	25
4529	"	♀	163	83	50	23	12	16	20	16.3	24
5051	Bindloe.	♂	160	81	44	24	12.5	15.5	21	16.3	24
5136	"	"	163	81	50	23	11.5	14	19.5	16.7	24.3
5067	Abingdon.	"	168	80	50	24	12.5	15	21.5	16.5	25
4917	"	"	168	80	47	23	12	15	20.3	16	25
5206	"	"	161	81	45	23	12.5	15	21	15	24
4969	"	"	160	79	50	22.7	11.3	15	19.5	15	24.7
5107	"	♀	155	77	47	22.7	12.5	15	19.5	15	23
4414	Narboro.	♂	160	78	50	22.7	11.5	14.5	19.5	16	23
4444	"	♀	159	77	48	20.5	11	13	18	15	23.5

66. GEOSPIZA MAGNIROSTRIS Gould.

Geospiza magnirostris GOULD, Proc. Zool. Soc. Lond., p. 5, 1837 (Charles Island), and Zool. Voy. Beagle, III, Birds, p. 100, pl. 36, 1841. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 512, 1896; Bull. U. S. Nat. Mus., 50, Pt. I, 495, 1901.

Range. — Charles Island.

The specimens from which this species was described were collected by Darwin on Charles Island. No expedition since then has obtained specimens of the species from any of the islands of the archipelago. Rothschild and Hartert give the following measurements of the three adult males in the British Museum: "Culmen 26.5, 27, 27 mm.; height of bill at base 23.5–24 mm.; wing 91, 91, 95 mm.; tarsus 25 mm. These measurements show that *G. magnirostris* has both a larger bill and longer wing than any specimens of *G. strenua* yet obtained, and that the bill is much larger than that of the average *G. strenua* individual.

This ends the side branch begun with *G. fortis fortis* from *G. fuliginosa parvula* leading up to the largest-billed forms of *Geospiza* with the adult females in Stage III. We will now go back to the continuation of the series leading from *G. fuliginosa* through its varieties and through *G. debilirostris* and *G. septentrionales* into the subgenus *Cactornis*, where the females as well as the males acquire a melanistic plumage when adult.

67. GEOSPIZA DEBILIROSTRIS Ridgway.

Geospiza debilirostris RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 363, 1894, and XIX, p. 533, 1896 (James Island); Bull. U. S. Nat. Mus., 50, Pt. 1, p. 508, 1901. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 163, 1899.

Range. — James Island.

This species is slightly larger than *G. fuliginosa*, the wing of adult males measuring, according to Rothschild and Hartert, seventy-one to seventy-three millimeters. The basal depth of the bill does not exceed ten and one-half millimeters and is generally less than ten, while the culmen is about sixteen. The bill is, hence, but slightly larger than the bill of *G. fuliginosa difficilis*. On the other hand, the size of the bill and wing in *G. debilirostris* is identical with the measurements of smaller specimens of *G. septentrionalis* and the two species are separable only by the color of the under tail coverts, which, in the second named species, are of a distinct chestnut tone. Hence, in shape of the bill *G. debilirostris* is intermediate between *G. fuliginosa difficilis* and *G. septentrionalis*, and therefore between the former genera *Geospiza* and *Cactornis*. It is probable that if more specimens of *G. debilirostris* could be examined the size of the bill would be found to intergrade with that of *G. f. difficilis*. The difference in length of wing, however, is considerable, so that it is possible that this may be found a specific character.

We have two immature specimens taken in April at James Bay, on James Island, that we refer to this species.

68. GEOSPIZA SEPTENTRIONALIS (Rothschild and Hartert).

Geospiza scandens septentrionalis ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 165, 1899 (Wenman and Culpepper Islands). — RIDGWAY, Bull. U. S. Nat. Mus., 50, Pt. 1, p. 510, 1901.

Range. — Wenman and Culpepper.

This form is more distinct from those nearly related to it than was indicated by its describers. The bill in the smallest billed specimen is not different from that of the last species, *G. debilirostris*, and on the other hand the bills of the larger specimens intergrade in size with those of the next species, *G. scandens*. In shape the bill resembles more nearly than does that of any other species the beak of *G. conirostris propinqua*. One Culpepper specimen has an unusually large bill, the culmen measures eighteen millimeters, the width at the base is seven and three tenths millimeters, the greatest depth at the base nine and one half millimeters. The smallest billed specimen of *G. c. propinqua* has a culmen of eighteen and one half millimeters. The width

of the bill is ten millimeters and the greatest depth thirteen millimeters. One adult male has a deep groove on each side of the culmen running from the nostril, parallel with the curvature of the culmen, to the tomium, exactly as does one of the specimens of *G. c. propinqua* from Tower. Some of the others have less distinct grooves.

Hence in the shape of its bill this species might be related in three different directions with the *G. fuliginosa* series through *G. debilirostris*, with the *G. scandens* series (both of these being very close), and finally, but not so closely, with *G. conirostris* through *G. c. propinqua*.

The adult males differ from the other species of *Geospiza* in having the pale marginal parts of the under tail coverts of a very decided rusty or even chestnut color. This is the only character by which the form can be specifically separated from either *G. debilirostris* or *G. scandens*.

We have no females which are surely adults. All of the female specimens in the collection have yellowish bills, or yellowish with dusky at the base and at the tip. They are plain brown above with the feathers edged with buff; below heavily streaked with dark brown except on the middle of the abdomen, which is plain buffy whitish. All of these have prominent wide rusty almost chestnut edgings to the middle and greater wing coverts.

Two other clearly young specimens, one a female and the other a male, having purely yellow bills, have the spots below mostly confined to the breast and the region in front of it. The abdomen is whitish in the middle, strongly shaded with buff on the sides and on the flanks. The wing coverts have bright chestnut borders.

Two adult males of *G. conirostris propinqua*, including the specimen of this species from Culpepper, have a slight tinge of chestnut on the under tail coverts.

The fact of the similarity of shape between the bills of *G. septentrionalis* and *G. conirostris propinqua*, the occasional occurrence of grooves on the sides of the upper mandible in each, and the exceptional presence of a chestnut color on the under tail coverts of the latter species — a marked characteristic of the former — might be taken as evidence of a derivation of *G. conirostris* direct from *G. septentrionalis*. But since the bills of some specimens of *G. conirostris propinqua* can almost be duplicated by bills of *G. scandens rothschildi*, which stands at the top of the *G. scandens* series, and since the dark color of the adult females and young in *G. conirostris* is simply the maximum of the tendency shown by the whole *G. scandens* series, we think it most logical to regard *G. conirostris* as following naturally *G. scan-*

dens rothschildi. The gradation in size and shape of the bill from *G. septentrionalis* into *G. scandens* through *G. s. scandens* is complete. Hence we begin *G. scandens* with this subspecies.

MEASUREMENTS OF *Geospiza septentrionalis*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus.
3847	Culpepper.	Ad. ♂	130	73	45	17	9	7.7	9.7	11	22
3848	"	"	140	73	47	16	9	7.3	10	10.7	23.7
3849	"	"	145	70.5	44	16	8.5	7	9.3	10.5	22
3850	"	"	148	74	45.5	16.5	8.7	7.7	9	11	22
3892	"	"	145	72	48	17	9	7.3	9	11.3	22
3901	"	"	154	74	48	18	9.5	7.5	9.3	12	22
3851	"	Im. ♀	143	69	45	16	8.7	7.3	9.5	10.5	22
3873	Wenman.	Ad. ♂	125	72	44	16	8.5	6.7	9	10	22
3875	"	"	130	74	47	15	8.5	7.3	8.5	9.7	22
3863	"	"	135	72.5	46	17	9.5	7	8	11.5	22
3864	"	"	135	71	49	16.5	9	7.5	9	11	22
3857	"	"	143	69	47	16.5	9	7.3	9.3	11	23
3870	"	Im. ♀	137	70	44	16.5	9	7	8.7	11	21.5
3856	"	"	140	69	42	15	8.7	7	7.5	10	21.5
3867	"	"	122	69	42	15	8	7.3	9	10	21
3874	"	"	133	67.5	42	15.7	8.7	6.7	8	11	20.7
3865	"	"	130	68	45	16	8.7	7	8.5	11	20.7
3871	"	"	—	64	—	16.5	8	7	8.3	10.5	22
3872	"	"	136	68	43	16	8.5	6.5	9	10.5	20

Subgenus **Cactornis** Gould.

Cactornis GOULD, Proc. Zool. Soc. Lond., p. 6, 1837. (Type, *Cactornis scandens* Gould.)
Geospiza Gould (in part).

Adult males same in color as adult males of *Geospiza* proper. Sexes dissimilar. *Adult females and young blackish*, either in plumage corresponding with Stage IV of young males of *Geospiza* and *Camarhynchus* or in Stage V. Bill various, either elongate and slender or thick and conical.

This subgenus was formed by Gould for slender billed *Geospizæ* such as *G. scandens*. However, a distinction between *Geospiza* and *Cactornis* based on the bill does not hold, but the type of Gould's *Cactornis* can be retained as the type of a distinct group based on color as given in the last paragraph. The adult females are continuously dusky over the upper and anterior parts, and the abdomen is heavily streaked with dark brown. Young birds in the first plumage resemble the adult males except that they have the rufous wing bands

invariably characterizing birds of the age of Stage II of the other subgenera.

69. THE GEOSPIZA SCANDENS SERIES.

The variation in the shape and size of the bill in this series amounts to but little. We begin with the smallest billed variety which follows naturally *G. septentrionalis*, and end with the largest billed form, *G. scandens rothschildi*, which leads easily into *G. conirostris propinqua*, and this into the again conical billed form, *G. conirostris conirostris*.

The plumage of the varieties of *G. scandens* differs from that of any of the forms so far described in that the adult females and the young present a strongly melanistic phase. Adult females instead of being pale brown spotted forms as in *G. fuliginosa* and *G. fortis* are continuously dusky over the back, head, and throat, corresponding with Stage V of immature males of *G. fuliginosa* instead of with Stage III as do the adult females of this species. Young birds of both sexes soon after leaving the nest acquire the same dusky plumage of the adult females except that they have the rufous borders to the wing coverts characteristic of birds of their age. The varieties from Abingdon and Bindloe present the maximum of this melanistic tendency in the female and young reached by any forms of the species. The next species, however, *G. conirostris*, is still blacker in these forms and represents the farthest advance toward complete melanism attained by the genus.

The forms now included under the species *G. scandens* were regarded by Gould as constituting a distinct genus, *Cactornis*. The intergradations at each end with other forms, however, are, as has already been recognized by Ridgway and by Rothschild and Hartert, unbroken. Rothschild and Hartert regarded *Camarhynchus pallida* as being intermediate between the genera *Camarhynchus* and *Geospiza*. This may be true of the bill, but, as we have already shown, the plumage of *C. pallida* separates it widely from any species of *Geospiza*, and especially from those which it most resembles in the shape of the bill.

69*a*. GEOSPIZA SCANDENS SCANDENS (Gould).

Cactornis scandens GOULD, Proc. Zool. Soc. Lond., p. 7, 1837 (James Island); Zool. Voy. Beagle, Birds, p. 104, pl. 42, 1841.

? Cactornis assimilis GOULD, Proc. Zool. Soc. Lond., p. 7, 1837 (? Charles Island according to Rothschild and Hartert, Bindloe Island according to Gould which cannot be correct); Zool. Voy. Beagle, Birds, p. 105, pl. 43, 1841.

Geospiza intermedia RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 361, 1894 (Charles Island), and XIX, p. 535, 1896.
Geospiza scandens RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 534, 1896 (James Island); Bull. U. S. Nat. Mus., 50, Pt. I, p. 509, 1901.
Geospiza scandens scandens ROTHSCHILD AND HARTERT, Novit. Zool., XI, p. 164, 1899 (James Island).
Geospiza scandens intermedia ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 164, 1899 (Charles Island).

Range. — James and Charles.

We cannot distinguish any difference between the specimens of this species from Charles and those from James. The measurements of the bills in the two sets are the same. The smallest ones intergrade in size with the bills of *G. septentrionalis*.

Our collection contains ten males in black plumage and two adult females taken on Charles in May, and seven adult males and five young birds taken near James Bay on James Island in April. The adult females are very dark, being continuously dusky over the back, head, throat and breast. The young birds from James are in Stage I. They were taken April 22.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza scandens scandens*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Width of Bill at Base.	Depth of Bill at Base.	Maxilla from Nostril.	Tarsus.
4713	Charles.	♂	142	70	45	19	11	8	9.5	14	17.5
4715	"	"	140	70	44	18	10	8	9.7	12.5	21.5
4884	"	"	152	72.5	45	18	10	7.5	10	12.5	21
4708	"	♀	146	71	46	20.5	10.5	8	9.5	14	20.5
4735	"	"	130	67	43	19	10.3	7.3	8.7	13.5	21
4594	James.	♂	140	73	45	19.5	11	8	10	13.5	21
4596	"	"	136	69	41	18.5	10.3	7.5	8.7	13	21
4597	"	"	140	68	46	20	11.5	8.3	9.7	13.7	22.3
4592	"	"	128	71	45	18	11.3	7.5	8	13	20
4518	"	"	129	70	46	18	10	7.3	9.5	12.3	20.7
4596	"	"	126	68	47	18.5	10	7.7	9	13	20
4542	"	"	135	70	44	19	11	7.5	8.5	13.5	19

On James this species was found rather common some distance inland from James Bay where the vegetation was heavier. None of these birds was seen near the beach. Some of the males were heard singing a song sounding like *teu'-lee*, *teu'-lee*, *teu'-lee*, *teu'-lee*. Two birds specially observed always repeated the set of two syllables four times in succession. The tone of the voice resembled exactly that of the conical-billed *Geospizæ*. Another song that was heard more

frequently than the last resembled *teur'-wee-wee*, *teur'-wee-wee*, *teur'-wee-wee*. In each set the first syllable carried the accent and was separated from the second by a longer interval than that between the second and the third. Many were heard uttering a song sounding like *bŭr'-tee-tee-tee*, *bŭr'-tee-tee-tee*.

The species was about as abundant on Charles as on James, but was found much nearer the coast.

69*b*. GEOSPIZA SCANDENS FATIGATA (Ridgway).

Geospiza fatigata RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 293, 1895 (Indefatigable Island), and XIX, p. 539, 1896; Bull. U. S. Nat. Mus., 50, Pt. 1, p. 511, 1901.

Geospiza barringtoni RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 361, 1894 (Barrington Island), and XIX, p. 541, 1896.

Geospiza scandens fatigata ROTHSCHILD AND HARTERT, Novit. Zool., p, VI. 164, 1899.

Range. — Indefatigable, Seymour, Barrington, Chatham, Duncan, Jervis and Albemarle.

This form differs from *G. s. scandens* in the slightly larger bill. We have adult specimens from only Seymour and Barrington; the two sets are indistinguishable from each other. Immature specimens from Seymour, Indefatigable and Albemarle are apparently the same, but those from Chatham have the bill considerably shorter and thicker, more as in the young of *G. s. abingdoni*.

The adult females of this species are much darker than females of *G. fuliginosa*, *G. fortis*, etc. The back, top and sides of the head and the throat are continuously dusky. The spots of the breast and abdomen are dark dusky brown. The collection contains six adult females, all of which are colored thus and absolutely duplicate the color of males in Stage IV of *G. fuliginosa* and the *G. fortis magnirostris* series.

Young specimens of both sexes taken in April vary in plumage from Stage I to Stage III of *G. fuliginosa*, etc., except that they all have the wide rufous bands on the wing coverts, indicating, together with the date, that they are birds of the same season. The bills of all are dusky above, yellow below. The collection contains three immature specimens from Iguana Cove, Albemarle, taken in June. One is a male, whose plumage is entirely dusky except for pale tips to the feathers of the abdomen, but the bill is blackish only at the base, the rest being yellow. It has distinct but narrow rufous edgings on the wing coverts. The other two young specimens, the sex of which is undetermined, are in the plumage of Stage III, the wing coverts have

wide bands of rufous and the bill is dusky above, yellow below. Two immature specimens from Chatham taken in May are in the plumage of Stage III.

On southern Seymour we found this species very common during the last of April and the first of May. The most common song uttered by the males consisted of a simple series of similar notes, thus: *tlee-tlee-tlee*, etc., the song consisting sometimes of only three or four notes but generally of a larger number — six or seven. They sang also another song which resembled *teur'-wër-wër*, *teur'-wër-wër*, *teur'-wër-wër*, this one being very much like one of the songs of *G. fortis*. A third sound that they uttered, but infrequently, was somewhat like *zee'-eurp*. This they uttered singly, *i. e.*, they never repeated the set of two syllables several times in succession so as to make a more prolonged "song."

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza scandens fatigata*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Basal Width of Bill.	Basal Depth of Bill.	Maxilla from Nostril.	Tarsus
4978	Barrington.	♂	154	70	44	19	11	8	11	13.5	20
5007	"	"	155	71	41	19	11	8	10	13	21
4982	"	"	140	72.5	43	20	10.7	8.3	10.5	14	22
4943	"	"	150	71	46	21	12	8.5	10.5	15	21
4994	"	"	138	71	41	20	11	8.3	10.7	14.5	21.5
4947	"	"	148	70	42	21.5	12	8.3	11.5	16	21.5
4991	"	"	129	71	41	18.5	10.5	8	10.5	13	21.5
4920	"	"	144	69	39	20	11.3	8	10	14.5	21.5
4954	"	"	147	72	38.5	20.5	11.7	9	11.3	14.5	22
4950	"	"	154	71	44	20.5	11	8.5	10.5	13.7	23
4951	"	"	142	70	44	21	11.5	8	10.3	14.7	21.5
4979	"	"	146	69	42	20	11	9	11	14	21.5
4963	"	"	147	71	39	21.5	12.5	8.7	10.5	15	23
4968	"	♀	135+	69	—	21.5	12	8.5	10.5	15	21.3
4983	"	"	140	68.5	39.5	21	11.5	8.3	10.5	15	21.5
4938	"	"	141	65	40	19	10.5	8	10	13	21
4995	"	"	140	68.5	38.5	19	11.5	7.7	10	14	20.5
4675	South Seymour.	♂	144	71	45	21	11	8.5	11	14	21.3
4650	" "	"	—	67	—	18.5	10	8	10.5	12.5	22
4666	" "	"	146	71	42.5	22	12.5	8.7	11	16	22.5
4687	" "	"	145	69	44	21	12	8.5	10	15	20
4628	" "	"	148	72	41.5	22	12	9	10.3	15.7	22.5
4653	" "	"	150	72.5	42.5	21	11.5	8	9.3	14	21.5
4672	" "	"	144	71	43	21	11.5	8	11	14.7	21.7
4638	" "	"	145	68	42	20	11.3	7.7	9.5	13	21
4642	" "	"	146	68.5	45	20.5	11	8	10	14	21
4627	" "	"	136	67	42	20.5	11.7	8	10.3	14.5	22
4648	" "	♀	143	70	43	20	11	8	10	14.5	20.5
4700	" "	"	148	69.5	41	21	12	7.7	10	15	21

On Barrington we found the species even more abundant than on Seymour. Males in black plumage here predominated. The species is rare on Albemarle, we found it only at Iguana Cove where but three immature specimens were secured. We have also three immature specimens from Chatham, but we did not find the form on Duncan.

69*c*. GEOSPIZA SCANDENS ABINGDONI (Sclater and Salvin).

Cactornis abingdoni SCLATER AND SALVIN, Proc. Zool. Soc. Lond., pp. 323, 326, 1870 (Abingdon Island).

Geospiza abingdoni RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 540, 1896 (Abingdon Island); Bull. U. S. Nat. Mus., 50, Pt. 1, p. 513, 1901.

Geospiza scandens abingdoni ROTHSCHILD AND HARTERT (in part), Novit. Zool., VI, p. 165, 1899 (Abingdon and Bindloe).

Range. — Abingdon.

Birds of this species from Abingdon and Bindloe can be distinguished from each other by the larger size of the Bindloe bill. *G. s. abingdoni* is very close to *G. s. fatigata*, differing from it in the slightly deeper bill, being in this respect intermediate between it and *G. s. rothschildi* of Bindloe Island.

MEASUREMENTS OF IMMATURE SPECIMENS OF *Geospiza scandens abingdoni*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Width of Bill at Base.	Depth of Bill at Base.	Maxilla from Nostril.	Tarsus.
5188	Abingdon.	♂	148	71	45	20.3	11	8.3	10.3	14.3	21.7
5044	"	"	140	72	44	21	12	8.3	10.3	14.7	22.5
5070	"	"	146	72	48	20.5	11	8.5	10	14.3	22
5113	"	"	145	72	42	20	11.3	8.5	10	14.3	22
5047	"	"	142	71	47	20	11.5	7.7	11	14.0	22
4931	"	♀	155	72	46	21	12	8.5	11	14.5	22.5
5283	"	"	138	63	39	19.5	11	8.3	10.3	13.3	20.5
4930	"	"	140	69	39	20	11	8	11	14.5	21

From both Abingdon and Bindloe we have only immature specimens in the collection. Nearly all are in plumages corresponding with Stages III and IV, but have rufous bands on the wing coverts and bills either entirely yellow or mostly yellow with some dusky above. These specimens are the blackest of all the varieties of *G. scandens* in immature stages. They are almost as dusky as the adult females and young of *G. conirostris*.

69*d*. GEOSPIZA SCANDENS ROTHSCHILDI
Heller and Snodgrass.

Cactornis assimilis SCLATER AND SALVIN, Proc. Zool. Soc. Lond., p. 323, 1870 (Bindloe Island).— SALVIN, Trans. Zool. Soc., IX, p. 486, 1876 (Bindloe Island).— SHARPE, Cat. Birds Brit. Mus., XII, p. 18, 1888 (Bindloe) (*probably not C. assimilis of Gould which did not come from Bindloe*).

Geospiza assimilis RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 537, 1896 (? James and Bindloe) (*probably not of Gould*).

Geospiza scandens abingdoni ROTHSCHILD AND HARTERT (in part), Novit. Zool., VI, p. 165, 1899 (Abingdon and Bindloe Islands).

Geospiza scandens rothschildi HELLER AND SNODGRASS, The Condor, Vol. III, No. 3, May, p. 75, 1901 (Bindloe Island).

Geospiza rothschildi RIDGWAY, Bull. U. S. Nat. Mus., 50, Pt. I, p. 673, 1901.

Range. — Bindloe.

This species is very similar to *G. s. abingdoni* but the bill is considerably thicker, being the heaviest of all the varieties of *G. scandens*. The basal depth is equal to the length of the gonys.

Only immature birds are in the collection but these differ so conspicuously from specimens of *G. s. abingdoni* of the same age that it is very probable that adults will be found to differ correspondingly. Some of the thickest billed specimens have bills almost as large as some of the smaller billed specimens of *G. c. propinqua* from Tower. The measurements of the bill of one young specimen of *G. c. propinqua* of the same age as the Bindloe specimens are as follows: culmen 19, width of bill at base 10, greatest depth at base 12. This, it will be seen by comparison with the table of measurements of *G. s. rothschildi*, is extremely close to the bill proportions of some specimens of this species.

MEASUREMENTS OF IMMATURE SPECIMENS OF *Geospiza scandens rothschildi*.[1]

Cat. No. Stan. Univ. Mus	Locality.	Sex.	Length.	Wing.	Tail	Culmen.	Gonys.	Width of Bill at Base.	Depth of Bill at Base.	Maxilla from Nostril.	Tarsus.
5146	Albemarle, Iguana Cove.	♂	148	72	45	21.5	12	9.5	12	15	20
5237	" "	"	141	71	41	20	11.5	8.5	11.5	14	20
5145	" "	"	147	69	43	21.5	12	9	11.5	15.5	23
5122	" "	♀	152	71	44	19.5	11	9	11.5	14	21.7
5173	" "	"	140	67	43	20.5	10.5	8.5	11	14.5	21.5
5175	" "	"	145	71	40	20	11	8	11.5	14	22
5163	" "	"	144	65	38	20	11	8	10.5	14	20.5

[1] Rothschild and Hartert (Novit. Zool., IX, p. 398) retain the Bindloe form under *G. s. abingdoni*. Their measurements of the bill depth for Abingdon specimens, however, vary from 10 to 10.5, and for Bindloe specimens from 11 to 12.

Hence there is almost a perfect gradation through this subspecies from the slender billed *Cactornis* group to the next species, *G. conirostris*, which ends at the top of the *Geospiza* series with a bill again enlarged and conical and with very dark plumage in the adult female and young.

The remarks on the plumage of *G. s. abingdoni* apply also to this form.

This species is not common. All our specimens were taken about the middle of June. We did not even see any adult individuals.

70. THE GEOSPIZA CONIROSTRIS SERIES.

This species presents probably the greatest variation in the size and shape of the beak of any of the species of *Geospiza*. Two apparently well separated species were formerly described by Ridgway from the extremes of *one subspecies*, *G. c. conirostris*, living on Hood. The bill in shape resembles that of *G. f. fortis*, differing from it at one end of the series, mainly in being larger. The species comprises two subspecies, of which *G. c. conirostris* of Hood has the larger and more conical beak, resembling in shape that of *G. f. fortis;* while the other, *G. c. propinqua* of Tower and Culpepper, has a more slender beak resembling in shape that of *G. septentrionalis* of Culpepper and in both shape and size in some cases that of *G. scandens rothschildi* of Bindloe. The size of the bill of an average specimen measures as follows: Culmen 22, gonys 11.5, width of bill at base 12, depth at base 16.5. The variations are as follows: Culmen 19 to 24, gonys 10 to 14, width of bill at base 10 to 13.5, depth at base 13 to 18. All of these variations in size occur within the subspecies *G. c. conirostris*, but the bill of *G. c. propinqua* averages smaller than that of *G. c. conirostris*.

The plumage of this species presents the farthest advance toward complete melanism, *i. e.*, of both sexes and all ages, attained by any species of *Geospiza*. It reaches a stage farther in the females and young than it does in the last species. The adult females have a greater amount of dusky on them than do males of *G. fuliginosa*, *G. fortis*, etc., in Stage IV, since the belly, instead of being mostly pale, is heavily streaked with dark brown. The back, head, throat and breast are continuously blackish-brown, except that the feathers of the back have slight brownish edgings. The young soon after leaving the nest resemble the females.

The fact that the beaks of the smallest billed individuals of this species are so close in shape and size to those of the largest billed in-

dividuals of the last, *i. e.*, those living on Bindloe, and the fact that the melanistic tendency in the adult females and young in the Bindloe form of *G. scandens* approaches nearest in degree to that of *G. conirostris*, indicates a natural transition from *G. scandens* to *G. conirostris*. The few facts that might be taken as evidence of a relationship between *G. c. propinqua* and *G. septentrionalis* have already been given under the latter species.

Since, in the general evolution of the groups *Cactospiza*, *Camarhynchus*, *Geospiza* and *Cactornis*, the color of the plumage is seen to be a much more constant character than the size and shape of the bill, and a characteristic, in all other cases, of apparently natural groups, we see no reason why it should not be relied on in the case of *G. conirostris*, and be made the basis for including this species in the group *Cactornis*. Taking the color as the more fundamental character in the classification of all these groups, and the shape of the bill as a secondary one, then *G. conirostris conirostris* must be regarded as the most specialized of all the *Geospizæ*, and be placed at the top of the series, a position that has by all previous writers in the genus been given to *G. magnirostris*.

70*a*. GEOSPIZA CONIROSTRIS PROPINQUA (Ridgway).

Geospiza propinqua Ridgway, Proc. U. S. Nat. Mus., xvii, p. 361, 1894 (Tower Island), and xiv, p. 543, 1896; Bull. U. S. Nat. Mus., 50, Pt. 1, p. 499, 1901.

Geospiza conirostris propinqua Rothschild and Hartert, Novit. Zool., vi, p., 159, 1899.

Geospiza conirostris subsp. ? Rothschild and Hartert, Novit. Zool., vi, p. 160, 1899 (Culpepper Island).

Range. — Tower and Culpepper.

We have seven adult males from Tower taken in June, one adult male from Culpepper taken in December, and two young males and two young females from Tower. We apparently have no adult females.

The shape of the bill in this subspecies is very similar to that of *G. c. conirostris*. Between the bills of some specimens from Tower and Hood there is absolutely no difference, but the bill of the Hood Island variety averages larger. The bill of *G. c. propinqua* generally has a more curved culmen and less acute tip.

The collection contains eight adult males. Two of them have not quite reached the purely black phase of Stage V, having a few narrow whitish edgings to the feathers of the lower part of the abdomen and a few brownish feathers on the back. Two specimens have a slight tinge of chestnut on the under tail coverts. Most of these males are

moulting. The bills are very pale, being either dusky brown all around, or having the upper mandible dusky and the lower pale brownish or even pinkish-yellow; one purely black specimen has also the sides of the upper mandible yellowish. The male from Culpepper taken in December has the bill blackish-brown except the sides of the base of the lower mandible which are yellowish-brown. Immature males resemble those of *G. c. conirostris* but the feathers of the back are widely margined with grayish-buff; they also lack, in most cases, conspicuous buffy edgings to the greater and middle wing coverts, although one specimen has them well developed. We have no female specimens that appear to be mature, but, from the light color of the bill in the adult male, one would expect to find a still paler bill in the female.

The bill of one specimen has a distinct groove on each side of the upper mandible, running from the nostril, in a curve parallel with the culmen, to the tomium. Another has a less distinct groove in a similar position on the left side of the upper mandible.

The following measurements show that the Culpepper specimen does not differ from the Tower specimen. They show also the intergradation between this form and the one on Hood, and the small difference between this species and *G. scandens rothschildi*.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza conirostris propinqua*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Width of Bill at Base.	Depth of Bill at Base.	Maxilla from Nostril.	Tarsus.
5214	Tower.	♂	155	76	48	21	12	11	14.5	14.5	23
5109	"	"	145	74	47	18.5	10.5	10	13	13.5	23
5233	"	"	150	73	45	19	11	10	13	14	23
5005	"	"	150	74	42	21	11.5	10.3	14	15	22.5
5281	"	"	155	78	53	21.5	11.5	11	14.7	15	24.5
5129	"	"	140	73	49	20	10	10	13	13	24
5171	"	"	146	76	45	21	11	10	13	14	22
3905	Culpepper.	"	160	77	51	20	10.5	10	14	13.5	24

70*b*. GEOSPIZA CONIROSTRIS CONIROSTRIS (Ridgway).

Geospiza conirostris RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 106, fig. 2, 1890, and Proc. U. S. Nat. Mus., XIX, p. 516, 1896 (Hood Island); Bull. U. S. Nat. Mus., 50, Pt. 1, p. 498, 1901.

Geospiza media RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 107, fig. 3, 1890 (Hood Island).

Geospiza conirostris conirostris Rothschild and Hartert, Novit. Zool., VI, p. 158, 1899 (Hood Island).

Range. — Hood and Gardner near Hood.

The collection contains sixteen adult males mostly in pure black plumage. One bird, however, has the primaries almost reddish-brown, contrasting strongly with the rest of the plumage including the tertiaries. This bird is moulting and besides the brown wing feathers it has a few brown feathers scattered about over the back. One male having a black bill is in a plumage intermediate between Stages IV and V of *G. fuliginosa*.

Adult Females. — The adult female differs greatly from the females of other species in being as black as males of other species in Stage V. Upper parts blackish or blackish-brown, feathers of the middle of the back with grayish or light brown edgings. Primaries and secondaries brown, edged with rusty, in strong contrast with the black of the dorsum. Tertiaries black, edged with buffy gray. Rectrices sooty brown, sometimes edged with rusty. Sides and lower part of head, throat and breast black or blackish-brown. Feathers of lower breast, abdomen, sides and crissum with sooty brown central areas and wide buffy gray margins, giving a strongly streaked appearance to these parts. Bill blackish-brown above, paler brown below, blackish at tip and base. Feet blackish-brown.

There are four immature males and three immature females in the collection. The bills are black above, but are almost entirely pale below, the lower mandible having black only about the base and at the tip. These birds are evidently, judging from the condition of the bill and the general appearance of the feathers, but recently from the nest, *i. e.*, they correspond in age with Stage I of *G. fuliginosa* and *G. fortis*. They are in a plumage, however, very similar to that of the adult female except that they have certain characteristic marks of the young. The head all around, back, throat and breast are black or blackish-brown, the feathers of the back are edged more or less with buff. The wings are sooty brown. The middle and greater wing coverts are widely edged with rusty buff, a character belonging only to Stage I of other species. The abdomen, sides and under tail coverts are heavily streaked with blackish or sooty brown on the central parts of the feathers, the marginal parts of the feathers being buffy white.

This species was abundant on Hood in May. Their song was considerably different from that of other species of *Geospiza* and in itself presented a large amount of variation. One bird was heard sing-

ing a song resembling *tlee-leé-oo*, *tree-leé-oo*, *tlee-leé-oo*. The consonant sound was various and is hard to represent by the sound of letters. Another bird was heard uttering a song sounding like *cheé-you-hoo*, *cheé-you-hoo*, *cheé-you-hoo*. The space between the second and third syllables in each set was longer than that between the first and second, A third bird sang the following song: *cheé-ee-oo*, *cheé-ee-oo*, *cheé-ee-oo*. Another sang *chēē'-woo*, *chēē'-woo*, *chēē'-woo*. Still another bird sang a song resembling *twee'-ŭ'r'r'r-rwŭ*, the *r*-sound in the second syllable being trilled.

MEASUREMENTS OF ADULT SPECIMENS OF *Geospiza conirostris conirostris*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Gonys.	Width of Bill at Base.	Depth of Bill at Base.	Maxilla from Nostril.	Tarsus.
4805	Hood.	♂	135	77	43	21.5	12	12	16	15	23
4809	"	"	142	76	44	22	11.5	11	15	15	21
4877	"	"	147	72	45	21.7	12	11.7	16.5	15.5	22
4842	"	"	160	78.5	47	24	14	13.5	18	17.5	24.3
4839	"	"	158	78	45	23	12.5	12	16.5	16.3	23
4890	"	"	155	81.5	51	23	13	13	18.5	16	22.5
4757	"	"	151	80	45.5	23.5	11.5	10.7	15.5	15	23
4874	"	"	142	77.5	40	22	12	11	16	15.5	22
4883	"	"	155	78	47	22	11.5	12	16.5	15	23
4815	"	"	150	76	44	21.5	12	11.7	17	15.3	23.5
4898	"	"	152	80	47.5	22.5	11.5	12	16	15.7	21.5
4719	"	"	142	77	43	22.5	12.5	11.7	16.5	16	22
4750	"	"	145	76	44	22	11.3	12	16.5	16.5	21.5
4860	"	"		68		19	10.5	10	13	13	22
4849	"	"	153	78	47	21.5	11.5	10.7	15.5	15	23
4862	"	♀	140	74	38	21	12	11.5	15.7	15	20
4893	"	"	149	72	46	22	12.5	12	16	16	22
4810	"	"	145	76	46	22	12	12	16	14.7	22

The following are species of doubtful existence. It may be that the *types* from which they were described are simply "aberrant" forms of some of the well established species. In any case there is not at present enough material in museums to decide their status.

(*a*) GEOSPIZA DENTIROSTRIS Gould.

Geospiza dentirostris GOULD, Proc. Zool. Soc. Lond., p. 6, 1837; Zool. Voy. Beagle, III, Birds, p. 102, 1841. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 532, 1896; Bull. U. S. Nat. Mus., 50, Pt. 1, p. 507, 1901. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 163, 1899.

Range. — Charles.

Described from specimens in the British Museum taken by Darwin. No specimens referable to it taken since. Probably aberrant

individuals of *G. fortis fortis*, characterized by possession of a toothed mandible.

(*b*) GEOSPIZA SPEC. INC. Rothschild and Hartert.[1]

Geospiza spec. inc. ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 163, 1899 (Chatham Island).

Range. — Chatham.

Described as resembling *G. dentirostris* in proportions, but lacking the "tooth" of the upper mandible of that species. One adult male, described by Rothschild and Hartert, taken on Chatham by Baur and Adams.

(*c*) GEOSPIZA BREVIROSTRIS Ridgway.

Cactornis brevirostris RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 108, 1890, fig. 4; Bull. U. S. Nat. Mus., No. 50, Pt. I, p. 514, 1901.
Geospiza conirostris brevirostris ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 159, 1899 (Gardner Island, near Charles).

Range. — Charles.

Described from an immature specimen collected by the *Albatross*. Besides this specimen there is one taken by the Harris expedition and described by Rothschild and Hartert as differing from *G. conirostris conirostris* in having a slightly smaller and narrower beak.

Family HIRUNDINIDÆ.

Genus **Progne** Boie.

Progne BOIE, Isis, p. 971, 1826.

Range. — Temperate and tropical America. One peculiar Galapagos species.

71. PROGNE MODESTA (Néboux).

Hirundo concolor GOULD, Proc. Zool. Soc. Lond., p. 22, 1837 (Galapagos Archipelago).
Hirundo modesta NÉBOUX, Rev. Zool., p. 291, 1840 (Charles Island).
Progne modesta RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 505, 1896.
Progne concolor ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 152, 1899.

Range. — Charles, Chatham, Barrington, Indefatigable, Seymour, James and Albemarle.

This swallow is very abundant at some places in the archipelago. We found it most numerous near Elizabeth Bay, on the north shore of the southern half of Albemarle. We obtained it also at Tagus Cove

[1] This form has been named *Geospiza harterti* by Ridgway (Bull. U. S. Nat. Mus., 50, Pt. I, p. 507, 1901) and its standing as a species confirmed later by Rothschild and Hartert (Novit. Zool., IX, p. 397).

on Albemarle, and on the southern Seymour Island. The birds inhabited the crevices of the tufa cliffs facing the ocean about Tagus Cove.

MEASUREMENTS OF ADULT SPECIMENS OF *Progne modesta*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
3943	Albemarle, Tagus Cove.	♂	177	123	67	10	7.5	12
3897	" "	"	170	125	65	11	7.5	12
4195	" "	"	173	126	68	11	7	12.5
3909	" "	"	170	123	66			12
4121	" "	♀	163	121	62	10	6.5	11.5
4118	" "	"	166	119	63	11	7	12.5
3888	" "	"	167	120	64	11	6.7	12
4219	" Elizabeth Bay.	"	170	122	60	10	7	11.5
4701	Seymour.	"	177	120	68	12	7	11

Genus **Hirundo** Linn.

Hirundo LINNÆUS, Syst. Nat. ed. 10, I, p. 191, 1758.

Range. — Cosmopolitan.

72. HIRUNDO ERYTHROGASTER Bodd.

Hirundo erythrogaster BODD., Tabl. Pl. End., p. 45, 1873.
Hirundo rustica erythrogastra ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 152, 1899.

Range. — Breeding in North America, migrating into Central and South America. Galapagos Archipelago: Charles, Chatham and Hood.

We did not obtain any specimens of this species, but in May we saw several individuals flying about over Hood. The time of the year would lead one to suppose that they are resident in the archipelago.

Family MNIOTILTIDÆ.

Genus **Certhidea** Gould.

Certhidea GOULD, Proc. Zool. Soc. Lond., p. 7, 1837 (Galapagos Islands).

Range. — Galapagos Archipelago.

This genus is of doubtful affinities. It was described by Gould as belonging to the Fringillidæ, but was placed in the Cœrebidæ by Sclater and Salvin. Lucas (Proc. U. S. Nat. Mus., XVII, p. 309, 1894) concluded from a study of the anatomy of the genus that it has a "very near relation with *Dendroica*" and that it "surely belongs among the Mniotiltidæ."

Certhidea is peculiar to the Galapagos Archipelago and is known from every island of the group. We have only a small number of specimens, seventy six in all, but the genus has been well discussed by Rothschild and Hartert and we make only a few changes in the disposition of the species as given by these authors. There are eight varieties distinguishable, comprised under two species — *C. olivacea* and *C. cinerascens*, characterized as their names imply, one by an olivaceous color and the other by an ashy tone.

Nothing is certainly known of the nidification and eggs of *Certhidea*. We shot a female of *C. olivacea olivacea* at Iguana Cove, Albemarle, from a nest containing three eggs. The nest was exactly like that of *Geospiza fuliginosa* and the eggs were identical in size and coloration with those of the same species (see p. 310). Hence, since we have no other examples we hesitate in ascribing this nest to *Certhidea*.

The *Certhideæ* are insectivorous, differing thus from most of the *Geospizæ* which live on seeds, but the lowest member of the latter genus, *G. heliobates*, feeds entirely on insects.

The song in some cases resembles the ordinary songs of *Geospiza*, and there is nothing distinctive in their habits. The birds are to be found from the shore to the tops of the highest mountains.

The color of the young is very similar to that of the adult, the only particular specialization of the adults is the rufous or chestnut throat in the males of *C. olivacea*. The following is a description of a typical immature bird. The characters apply to any variety of *C. olivacea*.

Immature Male and Female (*C. olivacea*). — Above almost uniform dull olivaceous, the feathers of the head with dusky centers. Wing and tail feathers dusky brown, both remiges and rectrices edged with the color of the back, tipped with gray. The middle and greater wing coverts broadly edged in most cases with bright rufous. Below pale buffy whitish with a slight olive tinge, brownish-buff along the sides. Bill brownish above, pale below.

By a comparison of this description with the descriptions of the young in the first plumage of the subgenera *Cactospiza* and *Camarhynchus* of the genus *Geospiza*, it will be seen that the two almost duplicate each other (see pp. 277; 284). Furthermore, the rufous wing bands are characteristic of the first plumage of all the *Geospizæ*. This general resemblance in color between the young of these two genera is, in fact, so striking that it is very suggestive of an actual relationship existing between them. If such should be the case, *Certhidea* would be lower than any of the *Geospizæ*, since the adults

do not go beyond the condition of "Stage I" in *Geospiza* (see p. 276), being thus nearest to the lowest member of the *Geospiza* series, *G.* (*Cactospiza*) *pallida*.

73. THE CERTHIDEA OLIVACEA SERIES.

73*a*. CERTHIDEA OLIVACEA OLIVACEA (Gould).

Certhidea olivacea GOULD, Proc. Zool. Soc. Lond., p. 7, 1837; Zool. Voy. Beagle, III, Birds, p. 106, 1841. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 498, 1896; Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 763, 1902.
Certhidea salvini RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 358, 1894, and XIX, p. 500, 1896 (Indefatigable Island).
Certhidea albemarlei RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 360, 1894, and XIX, p. 500, 1896 (Albemarle Island).
Certhidea olivacea olivacea ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 148, 1899.

Range. — Indefatigable, Duncan, Jervis, James, Albemarle and Narboro.

Our collection contains of this species twenty two specimens taken in January, February and March at Tagus Cove and Iguana Cove on Albemarle; two from Narboro in March and April; two from James in April; and seven taken in April on Duncan. There are in the lot males with rufous throats from all the islands except Duncan.

The following good description of an *adult male* in full dress is given by Rothschild and Hartert: "Upper side pale olive, pileum and hind neck more olive gray, rump and upper tail coverts lighter and more yellowish-brownish; wings and tail dusky brown, outwardly edged with light olive, inner webs of remiges edged with whitish-gray; upper wing coverts broadly bordered with light reddish-brown, under wing coverts white, strongly washed with buff and yellowish-cinnamon; short superciliary line, extending to about four millimeters beyond the eye; chin, throat and fore neck bright rufous cinnamon; remainder of under surface creamy buff, with an olive tinge; sides washed with olive brown; breast with more or less concealed spots of bright rufous cinnamon; under tail coverts washed with rufous cinnamon." (Novit. Zool., VI, p. 148, 1899.)

The species was not abundant on Albemarle at either Tagus Cove or at Iguana Cove, but was more numerous at the latter place than at the former. The birds are generally rather quiet. At Iguana Cove they sang a song resembling *tw'ül-ee*, *tw'ül-ee*, generally uttering two sets in succession as one song. They uttered also a sound like *twee-twee*. At Tagus Cove the species was rare everywhere but was found in the thick brush at the base and on the side of the mountain back of

the cove, and also in the mangrove swamp at Turtle Point. On Narboro it was scarce also, although a few individuals were found in the small areas of vegetation on the sides of the central mountain, and others were seen frequently in the mangrove swamps along the east shore. On Narboro they were heard to sing a song resembling *twĭst'-tĕ-twee . . . ē . . . ē.*

MEASUREMENTS OF ADULT SPECIMENS OF *Certhidea olivacea olivacea.*

Cat. No Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4014	Narboro.	♂	110	55	37	11	7.3	18
4423	"	"	110	51	35	10.5	7.5	20.5
4447	"	"	111	51	36	11	7.7	20.5
4153	Albemarle, Tagus Cove.	"	109	51	35	11	7.3	19.5
4169	" " "	"	111	52	40	11	7.5	20
4214	" " "	"	108	54	40	11	7.7	20
4247	" " "	"	110	55	39	10.5	7.5	19.5
4258	" " "	"	104	53	35	10	7.5	20.5
4921	" " "	"	112	53	40	11	7	20
4068	" Iguana Cove.	"	105	52	36	10	7	19.5
4065	" " "	"	105	52	41	11	7.5	21
4098	" " "	"	106	52	38	11	7.7	20
4102	" " "	"	110	50	34	10.5	7	20
4315	" " "	"	112	54	36	10.5	7.5	18
4334	" " "	♀	114	52	37	11.5	7.5	22
4085	" " "	"	101	50	33	11	8	20
4312	" " "	"	115	52	34	10.5	7	19
4321	" " "	"	117	54	35	10.5	7.5	18.5
4612	Duncan.	♂	112	52	36	11	7.5	20
4711	"	"	106	52	35	10	7.3	20
4634	"	"	109	51	39	10.5	7.5	19
4669	"	♀	98	52	32	11	7	18
4517	James.	♂	99	52	34	10	7.5	21

73*b*. CERTHIDEA OLIVACEA LUTEOLA (Ridgway).

Certhidea luteola RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 360, 1894, and XIX, p. 501, 1896 (Chatham Island); Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 764, 1902.

Certhidea olivacea luteola ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 149, 1899.

Range. — Chatham.

There are only four specimens in the collection from Chatham. One adult male has a slight amount of rufous on the throat. The form is very similar to *C. o. olivacea*, differing from it mainly in being a little darker. The length of the bill from the nostril may be slightly longer.

MEASUREMENTS OF ADULT SPECIMENS OF *Certhidea olivacea luteola*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4887	Chatham.	♂	113	51	39	11	8	19
4896	"	"	114	53	38	11	8	21
4797	"	♀	121	55	36			20

73*c*. CERTHIDEA OLIVACEA RIDGWAYI Rothschild and Hartert.

Certhidea olivacea ridgwayi ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 149, 1899 (Charles Island).
Certhidea ridgwayi RIDGWAY, Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 765, 1902.

Range.—Charles.

We did not procure any specimens of this species. It is rare on Charles and has been taken only by the Harris expedition. According to Rothschild and Hartert it "differs much from *C. olivacea olivacea* and *C. olivacea luteola* in the much lighter under surface, which wants the olive tinge."

73*d*. CERTHIDEA OLIVACEA FUSCA (Sclater and Salvin).

Certhidea fusca SCLATER AND SALVIN, Proc. Zool. Soc. Lond., p. 323, 1870 (Abingdon and Bindloe Islands).—RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 502, 1896; Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 766, 1902.
Certhidea olivacea fusca ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 151, 1899.

Range.—Abingdon and Bindloe.

Slightly darker above and less olivaceous than *C. olivacea olivacea* or *C. o. luteola*, distinguished from these forms by the conspicuous buffy brown wash along the sides and on the flanks. Throat of the male tinged with rufous, and superciliary line of same color present. We have five specimens of this form, including one male with the bill entirely black, taken in June.

The buffy brown color of the sides of the body and the flanks characterizes all the specimens from Abingdon, Bindloe, Tower, Wenman and Culpepper; thus uniting *C. olivacea fusca*, *mentalis* and *becki* as a group inhabiting the northern islands of the archipelago and separating them from *C. olivacea olivacea* of the central islands. The brownish-buff color, however, grades into the less pronounced olivaceous-buff of the same parts in *C. olivacea olivacea* and *C. o.*

luteola. The grouping together of the forms of the more northern islands of the archipelago is similar to what obtains in the genus *Nesomimus*.

MEASUREMENTS OF SPECIMENS OF *Certhidea olivacea fusca*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
5238	Bindloe.	♂	115	53	34	11.7	8	18.7
5181	"	"	109	53	43	11	7.7	19
5167	"	♀	112	54	36	11	8	18
5193	Abingdon.	♂	111	51	36	11.5	8	19.7
5266	"	"	111	52	36	11.7	8.5	19.5

73*e*. CERTHIDEA OLIVACEA MENTALIS (Ridgway).

Certhidea mentalis RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 359, 1894 (Tower Island), and XIX, p. 504, 1896; Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 766, 1902.

Certhidea drownei ROTHSCHILD, Bull. Brit. Ornith. Club, VII, p. 53, 1898 (Culpepper Island). — RIDGWAY, Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 767, 1902.

Certhidea olivacea drownei ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 150, 1899.

Certhidea olivacea mentalis ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 150, 1899.

Range. — Tower and Culpepper.

MEASUREMENTS OF ADULT SPECIMENS OF *Certhidea olivacea mentalis*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
5086	Tower.	♂	116	52	38	11.3	7	18
5230	"	"	108	53	38	11.5	8.3	19
5132	"	"	114	55	41	11.5	8	20
5130	"	"	109	53	37	11.5	8	20
5199	"	"	113	54	39	12	8	19
5186	"	♀	114	55	40	12	8.5	19
5123	"	"	105	52	37	12	8.5	19.5
3855	Culpepper.	♂	110	55	39	11.5	8.3	19.7
3852	"	"	110	51	38	11.5	8	19
3854	"	♀		50	33	11	8	19
3853	"	"	113	50	36	11	8	19

We have nine specimens from Tower Island taken in June and four from Culpepper taken in December. We can discover no difference whatever between the two sets of specimens either in color or in proportion. The series as a whole can be distinguished from the six Abingdon-Bindloe specimens of *C. o. fusca* by the slightly darker, more brownish and less olivaceous upper parts. The distinction, however, is very slight. Hence, we combine *C. o. mentalis* (Ridgway) and *C. o. drownei* (Rothschild) into one variety.

73*f*. CERTHIDEA OLIVACEA BECKI (Rothschild).

Certhidea becki ROTHSCHILD, Bull. Brit. Ornith. Club, VII, p. 53, 1898 (Wenman Island). — RIDGWAY, Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 767, 1902.

Certhidea olivacea becki ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 149, 1899.

Range. — Wenman Island.

This form does not differ in color from *C. olivacea mentalis* of Tower and Culpepper. According to Rothschild it should be lighter below than *C. olivacea drownei* (Rothschild) of Culpepper, but our specimens from these two islands show absolutely no difference and, as before stated, do not differ in color from the Tower specimen. The bill of the two Wenman specimens, however, is shorter than the bill of *C. olivacea mentalis*, and apparently the subspecies may be retained on this character. Males have a distinct rufous tinge on the throat, a pale superciliary stripe and an entirely black bill.

We have only two specimens, taken in December on Wenman.

MEASUREMENTS OF ADULT SPECIMENS OF *Certhidea olivacea becki*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
3876	Wenman.	♂	107	52	39	10	7.3	18
3866	"	"	109	53	36	10.5	7.5	18

74. THE CERTHIDEA CINERASCENS SERIES.

74*a*. CERTHIDEA CINERASCENS CINERASCENS (Ridgway).

Certhidea cinerascens RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 105, 1889 (Hood Island), and XIX, p. 503, 1896; Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 768, 1902.

Certhidea cinerascens cinerascens ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 151, 1899.

Range. — Hood Island.

Almost no olivaceous shade anywhere. Upper parts, including the wings and the tail, brown, sometimes with an almost inperceptible shade of olive on the rump and upper tail coverts. Feathers of the head and back with grayish shafts. Wing feathers all edged with grayish. Below dull, dirty grayish, tinged with buff on the throat and middle of the breast, slightly washed with brownish along the sides and on the flanks. Auriculars light brown. Superciliary stripe gray. Bill of adults entirely black.

This variety, together with the next, form a well marked species distinguished from *C. olivacea* by the pallid grayish color.

We have fourteen adult males and three immature males of this form taken on Hood and the neighboring small Gardner Island in May. We did not obtain a female. The birds were very abundant about Gardner Bay on Hood. The young associated with one another in small flocks, much resembling thus in habits and appearance the Bush Tits (*Psaltriparus*) of California. Although the breeding season was over, the adults were still singing a great deal. Their ordinary notes consisted of monosyllabic *twĭts*. The adult males were generally found solitary, not associating with the flocks of young. One song that they sang resembled *tweet'' tĭ'tĭ-tweet' . . tweet . . . tweet*, the second and third syllables being short and but briefly separated from the one before. The first and fourth syllables were accented, while the fifth and sixth were separated by successively longer intervals. Another song resembled *tweet' tĭ-tweé-ū*.

MEASUREMENTS OF ADULT SPECIMENS OF *Certhidea cinerascens cinerascens*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4861	Hood.	♂	108	53	41	10.7	8	18
4873	"	"	109	54	37	11	7.7	19
4904	"	"	108	51	39	11.5	8	18.7
4846	"	"	104	53	38	11	8	19
4848	"	"	108	52	41	10.7	7.5	18.7
4835	"	"	105	51	36	10.5	8	18
4804	"	"	108	51	39	11	8	19
4901	"	"	106	50	38	11	8	19.5
4836	"	"	107	51	37	11	8.3	18.7

74*b*. CERTHIDEA CINERASCENS BIFASCIATA (Ridgway).

Certhidea bifasciata RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 359, 1894 (Barrington Island), and XIX, p. 304, 1896; Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 768, 1902.

Certhidea cinerascens bifasciata ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 151, 1899.

Range. — Barrington.

This form is similar to the last but is paler above and below, almost whitish below with a faint tinge of buff, and with a distinct olive tone above. The tips of the middle and greater wing coverts are specially pale in some specimens forming two fairly well marked bands on the wing.

This form was very numerous on Barrington in May. The young birds, as did those on Hood, remained banded together in small flocks, flying about in troops from one bush to another, continually uttering short *chĭp*-like notes.

We have two adult males and two adult females taken on Barrington in May.

MEASUREMENTS OF ADULT SPECIMENS OF *Certhidea cinerascens bifasciata*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4992	Barrington.	♂	108	51	32	12	8.3	20
4998	"	"	111	53	38	11	8	19
4987	"	♀	108	52	37	11	8.3	18.5
4996	"	"	113	50	35	11	8	17.5

Genus **Dendroica** Gould.

Dendroica GRAY, List Gen. Birds, App. III, p. 8, 1842.

75. DENDROICA PETECHIA AUREOLA (Gould).

Sylvicola aureola GOULD, Zool. Voy. Beagle, III, Birds, p. 86, pl. 28, 1841.

Dendroica aureola SCLATER AND SALVIN, Proc. Zool. Soc. Lond., p. 323, 1870. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 493, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 147, 1899.

Dendroica petechia aureola RIDGWAY, Bull. U. S. Nat. Mus., No. 50, Pt. II, p. 521, 1902.

Range. — Coast of Ecuador and Peru, Cocos and Gorgona Islands and every island of the Galapagos Archipelago.

We found this species generally distributed on all the islands from sea level to the tops of the highest mountains. It was most abundant

in the mangrove swamps of Albemarle and Narboro. On March 4 a nest was obtained at Iguana Cove, Albemarle, situated a few feet above the ground in the horizontal fork of a small bush. It contained four slightly incubated eggs. The nest is very compactly made and well shaped. The outside is composed of dead, grayish plant stems, green grass and a considerable quantity of cotton (*Gossypium*). The interior is lined with fine brownish rootlets and a few feathers. The dimensions are as follows: height 55, diameter 10, depth of cavity 33, diameter of interior 45.

The eggs are broadly oval in shape, resembling those of *Helmitherus vermivorus*, which they equal in size. The ground color of two of the specimens is light buff; this is heavily spotted and blotched, chiefly in the form of a wreath about the larger end, with umber, chestnut, lavender gray and black. The other specimen (one was broken) is more finely spotted with the same colors on a creamy white ground. They all measure 17 x 14.

MEASUREMENTS OF ADULT SPECIMENS OF *Dendroica petechia aureola*.

Cat. No. Stan Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4200	Albemarle.	♂	144	67	52	12.5	9.3	21
4070	"	"	142	69	54.5	12.5	8.5	20.5
3970	"	♀	140	62	51	13	9.3	20
4053	"	"	135	63	49	12.3	9	21
4148	"	"	144	66	54	12.3	9	20.5
4305	"	"	142	63	49	12.5	8.7	20
4329	"	"	126	64	50	12.5	9	20
3869	Wenman.	"	132	63	48	12.5	8.7	20.5
3868	"	♂	136	67	52	12.7	9.3	20.7
4088	Narboro.	"	148	67	55	12	9	21
3920	"	"	145	66	50	12.5	9	20
3904	"	♀	144	64	51	13	9	20.5
4487	James.	♂	133	66	49	13	9.5	21.5
4560	"	"	137	65	50	12.5	9	21
4637	Seymour.	"	136	64	48	13	9.3	20.5
4736	Charles.	"	146	63	48	12	9	20
4765	Chatham.	"	153	68	54	12	9	21
5084	Bindloe.	"	145	62	50	12.5	9	21

Another nest was found on June 27 near Tagus Cove, Albemarle. This nest contained two incubated eggs, only one of which was preserved. The nest was situated on a horizontal limb of a mangrove tree (*Avicennia*) about twelve feet above the water of the swamp.

It is more solidly constructed than the last, being composed outwardly of closely woven plant fibers, stems, cotton and egg cocoons of spiders. The interior is deep and lined with fine grass, and feathers of the Galapagos duck (*Pœcilonetta*).

The one egg preserved is much like those of the other set in shape and coloration. It has a creamy ground color and is blotched, mostly in the form of a wreath about the larger end with chestnut, umber and lavender-gray. The specimen measures 17 x 14.

The notes of this bird are much like those of any other *Dendroica*. One common song resembled *tū-weé*, *tū-weé*, *tū-weé-ū*, uttered rather rapidly. Another sounded like *tūl-twee-twee-twee*. The first syllable of this was somewhat prolonged and separated from the second by a space greater than that between the others.

We have eighteen adult specimens of this species from Albemarle, Narboro, James, Seymour, Charles, Chatham, Bindloe and Wenman. We observed it on all the other islands except Jervis which we did not visit.

Family TROGLODYTIDÆ.

Genus **Nesomimus** Ridgway.

Nesomimus Ridgway, Proc. U. S. Nat. Mus., xii, p. 102, 1890, footnote. (*Type, Orpheus melanotis* Gould.)

Generic Characters. — (From Ridgway.) "Similar to *Mimus* Boie, but bill longer and more compressed basally, and tarsus much longer (nearly twice as long as middle toe instead of only about one third longer)."

Whether these characters may be considered sufficient for generic distinction or not, the group is certainly a natural one and it is most convenient to recognize it as such by a generic name.

Nesomimus is peculiar to the Galapagos Archipelago where it has been taken on every island except Duncan. It is now apparently extinct on Charles, but specimens were taken on this island by Darwin.

76. NESOMIMUS TRIFASCIATUS (Gould).

Orpheus trifasciatus Gould, Proc. Zool. Soc. Lond., p. 27, 1837 (Charles Island).

Mimus trifasciatus Gray, Zool. Voy. Beagle, iii, Birds, p. 62, pl. 16, 1841 (Charles Island).

Nesomimus trifasciatus Ridgway, Proc. U. S. Nat. Mus., xix, p. 483, 1896. — Rothschild and Hartert, Novit. Zool., vi, p. 143, 1899 (Gardner Island, near Charles).

Range. — Gardner (near Charles). Extinct on Charles.

This species was taken on Charles by Darwin, but has not been seen

by any subsequent collectors on this island. It was taken on the small Gardner Island, near Charles, by the Harris expedition in 1897.

Rothschild and Hartert give the following description of *N. trifasciatus:* "This species is easily recognizable by its large size and broad blackish-brown band across the chest, interrupted and concealed in the middle. There are, however, not two bands, as one might expect from Ridgway's 'key.' The wing coverts have very conspicuous large white spots. The wing of the male is 128–130 mm. long, the tail 123 (about — most specimens being in worn plumage with the tails much abraded), tarsus 40, exposed culmen 26–27 mm. The same measurements in the *female* are: Wing 116–120, tail 115 (approximately), culmen 25–26, tarsus 38–40 mm. 'Iris seal-brown, tarsi, feet and bill blackish.'" (Novit. Zool., VI, p. 143, 1899.)

We obtained no specimens of this species, but we did not visit the Gardner Island in the neighborhood of Charles.

77. NESOMIMUS MACDONALDI Ridgway.

Nesomimus macdonaldi RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 103, 1890, fig. 1 (Hood Island), and XIX, p. 484, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 143, 1899.

Range. — Hood and the neighboring Gardner Island.

This species departs widely from all the other species of *Nesomimus* in the great size and curvature of the bill. The culmen varies from 33 to 37 in length, an excess of 6 over the culmen of *N. trifasciatus*. Otherwise its closest relationship is with this species on account of the brownish-buff band that crosses the breast. It is also related to *N. adamsi* of Chatham through the spots on the sides of the breast, and, in fact, stands intermediate between *N. trifasciatus* and *N. adamsi*.

Description of a Typical Specimen. — (No. 5308, adult male, Leland Stanford Jr. University Museum. Hood, May 15, 1899.) Above dusky brown and brownish-gray, the former color occupying the central areas of the feathers, the latter the margins; palest on the rump where the dark central areas of the feathers are the least prominent. Wings and tail blackish-brown, the quills narrowly edged with buffy grayish, the coverts with wide whitish margins, forming three poorly defined bands across the wing. The rectrices with very indistinct pale areas on the inner margins of the tips of the inner webs. Postocular region of head grayish-buff, continuous with an indistinct superciliary line of the same color. Auriculars blackish anteriorly, buffy posteriorly. Lores black. An indistinct blackish subocular line from the lores and a similar maxillary stripe on the side of the

throat, inclosing a buffy space between them. Sides of neck buffy. Lower parts buffy whitish, tinged with brownish across the breast, with a few brown spots on the sides of the breast, and darker brown spots along the sides of the abdomen and on the flanks. Under tail coverts whitish, under wing coverts whitish with dark brown centers. Under surface of primaries, secondaries and rectrices paler than above, the primaries and secondaries fading into buffy gray on their inner margins.

Female. — Like the male.

Immature. — Similar to the adults, but whiter below and thickly spotted across the breast; under tail coverts buffy; wing coverts and tertials widely bordered with bright buff and white; terminal spots on rectrices larger, paler and much more conspicuous.

We found the species abundant in May about Gardner Bay on Hood and on the adjoining Gardner Island. The Gardner Island on which *N. trifasciatus* was taken by the Harris expedition is another island of the same name lying near Charles. Our collection contains five adult males, five adult females and several immature birds of both sexes.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus macdonaldi*.

Cat. No Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4882	Hood.	♂	280	120	108	34.5	24	38
4832	"	"	274	123	107	34	23.5	39
4900	"	"	280	123	145	36.5	25.5	40
4888	"	"	280	124	110	35	24.5	40
5308	"	"	280	123	111	35	26	39
4872	"	♀	250	108	97	33.5	21	38
4816	"	"	275	115	105	34	23.5	38
4813	"	"	256	112	107	33.5	23	37.5
4808	"	"	260	110	102	33	21	39
4826	"	"	262	112	100	33	22.5	38

78. NESOMIMUS ADAMSI Ridgway.

Nesomimus adamsi RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 358, 1894 (Chatham Island); Proc. U. S. Nat. Mus., XIX, p. 485, 1896. — ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 145, 1899.

Range. — Chatham.

Description of a Typical Adult. — Back and scapulars light brown, in some specimens almost rusty brown, the feathers with darker cen-

ters. Rump paler brownish, with indistinct darker central areas to the feathers. Feathers of top of head with wide grayish-brown margins, narrow, elongate, dusky central parts. Hind neck with a light brownish-gray collar. A pale supraorbital stripe of the same color as the nuchal collar reaching to the latter from back of the nostril.

Lesser and middle wing coverts light brown with pale brownish-gray edgings. Greater wing coverts darker brown with narrow buffy edgings and wider ashy tips. Primaries dusky brown with narrow edgings of pale grayish-brown ;tips with slightly wider edgings of ashy. Secondaries lighter brown with narrow pale brown edgings.

Tail dusky brown, feathers with very narrow pale brownish borders, ashy toward the bases. Under surface of feathers paler, slaty. All the rectrices except the middle pair with a terminal spot of white on the inner web; spots of outermost feathers largest, about twenty millimeters in length, decreasing successively in size on the other feathers toward the middle; spots of feathers next the middle pair always very small, gone entirely when these feathers are much worn.

Lores, suborbital and auricular regions brownish-black. A white line just below edge of under eyelid. A narrow dusky malar stripe. Entire under parts dull whitish. Sides and flanks with dark brown streaks. Sides of lower breast with a few rather large spots of brown on the centers of the feathers; these spots rounded in outline behind, emarginate anteriorly. A slight brownish tone on feathers of lower part of breast, forming an indistinct band connecting the spotted areas of each side.

In coloration, especially in the presence of the spots of the sides of the breast, this form resembles the Hood race *N. macdonaldi* more than it does any other. The spots in the Chatham form, however, are not invariably present; in one specimen that we have they are entirely absent. The species is separated specifically from *N. macdonaldi* by the smaller size of the bill.

This species is very closely related also to the form inhabiting Indefatigable, but is always distinguishable from the latter by the presence of the maxillary stripes. In the color of the back *N. adamsi* is paler than any other form of *Nesomimus* on the archipelago, but in this respect it intergrades with *N. melanotis dierythrus*. It is intermediate between the forms having spotted breasts and those whose breasts are plain, and thus has given rise to two lines of differentiation. Along one line the dark maxillary stripes have been retained and the back has taken on a dusky rather than a brown tone; along the other the brown tone of the back has been retained but the maxil-

lary stripes are lost. The first branch includes the races inhabiting Tower, Abingdon, Bindloe and Culpepper; the second those races inhabiting Indefatigable, Barrington, Wenman, James, Albemarle and Narboro.

We have four adult specimens from Chatham taken May 23.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus adamsi*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4854	Chatham.	♂	240	111	105	25	17	37
4858	"	"	254	114	104	25.7	18	36.5
4806	"	"	253	111	105	25	17.5	39
5705	"	♀		102	93	23.5	16.5	36
Average.			249	109	102	24.8	17.5	37.6

79. THE NESOMIMUS PERSONATUS SERIES.

Rothschild and Hartert have grouped all the forms of *Nesomimus* except *N. trifasciatus*, *N. macdonaldi* and *N. adamsi* under one species *N. melanotis*. We think, however, that two groups instead of one can be distinguished, of which one, *N. personatus*, inhabits the more northern islands of the archipelago — Tower, Abingdon, Bindloe and Culpepper; while the other, *N. melanotis*, inhabits the central islands — Barrington, Indefatigable, Jervis, James, Albemarle and Narboro, and also Wenman, lying to the north.

The differences between *N. personatus* and *N. melanotis* are slight, but the former is characterized by a blackish tone to the central areas of the feathers rather than a brownish. In some cases the general shade of the upper parts in *N. personatus* may be even lighter than in *N. melanotis*, but the light color is due to the marginal areas of the feathers, the central parts in such cases being blackish.

N. personatus is represented by a different subspecies on each island where it occurs. Of these the one on Abingdon was described first and hence must give its name to the group. The Tower subspecies, however, resembles the Chatham species, *N. adamsi*, more than does any of the others, so with it we begin the species.

79*a*. NESOMIMUS PERSONATUS BAURI (Ridgway).

Nesomimus bauri Ridgway, Proc. U. S. Nat. Mus., xvii, p. 357, 1894 (Tower Island); Proc. U. S. Nat. Mus., xix, p. 492, 1896.

Nesomimus melanotis bauri Rothschild and Hartert, Novit. Zool., vi, p. 145, 1899.

Range. — Tower.

This species has been regarded by Rothschild and Hartert as a subspecies of *N. melanotis*. It cannot, however, be made a variety of this form because all the specimens possess well developed black maxillary stripes, a character not recorded on any specimen from James or Albemarle. The same character relates the form to *N. adamsi* of Chatham but it is separable from this species by the color of the back and by the slightly longer bill.

N. bauri differs from *N. adamsi* as follows: color of central parts of feathers of head blackish rather than brown, edges of some feathers grayish rather than brownish; central areas of feathers of back dusky brown instead of reddish-brown; wing and tail feathers decidedly more blackish and the pale edgings of the same wider and whiter; lores, suborbital and auricular regions black instead of brownish-dusky; sides of lower part of breast distinctly clouded with buff but not forming an entire band across the breast; no spots on the breast in any adult specimens.

In the collection are seven adult specimens from Tower, taken June, 1899.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus personatus bauri*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
5217	Tower.	♂	277	118	116	28	19.7	35.3
5263	"	♀	262	110	108	28	20	35
5119	"	"	256	104	100	28	20	34.7
5049	"	"	247	110	98	26.3	20	34.5
5198	"	"	263	109	110	27.7	19.5	35.3
5253	"	"	260	109.5	110	28	20	33.5
5162	"	"	245	110	102	27	18.7	34
Averages.			258	110	106	27.5	20	34.6

79*b*. NESOMIMUS PERSONATUS PERSONATUS (Ridgway).

Nesomimus personatus RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 104, 1890 (Abingdon Island); Proc. U. S. Nat. Mus., XIX, p. 488, 1896.

Nesomimus melanotis personatus ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 144, 1899.

Range. — Abingdon.

This form intergrades through the next — *N. personatus bindloei* — with *N. personatus bauri* of Tower. It is probable, however, that

the order of derivation has been the other way, *i. e.*, that the Abingdon form has been derived from the Tower race, for the latter is intermediate between it and the Chatham species. Hence, if the Abingdon form were named according to its zoölogical relationship it would be called "*Nesomimus bauri personatus*"; but, since the Abingdon race was described first, the names, according to the present canons of nomenclature, must stand as given above.

Color of upper parts still darker than in the Tower race, the blackish color of the head pervading also on the back, the whole dorsum being very dark and the lighter margins of the feathers inconspicuous. The nuchal collar is well marked only on the sides of the neck; across the nape it is almost obsolete. The sides of the breast are strongly shaded with buff as in the Tower form. A faint trace of a dark maxillary stripe is present in several specimens.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus personatus personatus*.

Cat. No. Stan Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4973	Abingdon.	♂	265	110	107	26.5	18.7	36.5
5059	"	"		108	104	26.5	18.7	36.5
5277	"	♀	244	110	110	26	18	34
5055	"	"	246	101	96	24	17.3	36.5
5227	"	"	256	109	102	26.5	18.7	37
5114	"		252	98	96	26	19.3	34.5
Averages.			253	105	102	26	18.4	36

The color of the back of the Abingdon specimens does not directly grade into that of the Tower specimens, but it does do so through those from Bindloe. The latter, however, lack all traces of the maxillary stripe. The bills of the Tower specimens average slightly larger than those from Abingdon, while the latter have bills a little larger than those of the Bindloe specimens. The bills of the Bindloe and Tower specimens intergrade in length only through the Abingdon specimens. Since these different sets of characters do not grade in the same direction, it is perhaps most probable that the Abingdon and the Bindloe races have been derived separately from the Tower form, yet they all intergrade in such a manner that we cannot name them as distinct species, although both the Abingdon and the Bindloe forms have characters that do not directly grade into those of the

Tower birds; from which we assume that they are independently derived. Actually they should probably be regarded as *species;* according to A. O. U. rules of nomenclature as *varieties.*

We have one adult male and three adult females of this subspecies, taken on Abingdon in June.

79*c*. NESOMIMUS PERSONATUS BINDLOEI (Ridgway).

Nesomimus bindloei RIDGWAY, Proc. U. S. Nat. Mus., XVII, p. 358, 1894 (Bindloe Island); Proc. U. S. Nat. Mus., XIX, p. 492, 1896.
Nesomimus melanotis bindloei ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 146, 1899.

Range.—Bindloe.

In the color of the back this form is intermediate between *N. p. personatus* of Abingdon and *N. p. bauri* of Tower. The central areas of the feathers of the head and back have the same blackish tone, but the pale edgings are wider than on the Abingdon specimens though not so wide as on those from Tower. The intensity of the nuchal collar is likewise intermediate between those of the other two forms. None of the specimens has any trace of a maxillary stripe, but this mark is absent on one of the Tower specimens.

The collection contains three adult males and three adult females from Bindloe taken in June.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus personatus bindloei.*

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
5124	Bindloe.	♂	247	103	101	24	17	34
4919	"	"	246	106	102	25	17.5	34.5
5186	"	"	248	107	102	24	17	35
5144	"	♀	232	102	100	25	16.5	33.5
5143	"	"	240	99	96	23.5	16.5	35
5156	"	"	240	101	103	23	16.5	34
Averages.			242	103	102	23.7	16.7	34

79*d*. NESOMIMUS PERSONATUS HULLI (Rothschild).

Nesomimus hulli ROTHSCHILD, Bull. Brit. Ornith. Club, p. 52, May, 1898.
Nesomimus melanotis hulli ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 145, 1899.

Range.—Culpepper.

This form is scarcely distinguishable in color from *N. personatus bauri* of Tower. The specimens average slightly darker in color of the back than do the Tower specimens and the maxillary stripe is somewhat more strongly developed. The bill, however, is considerably shorter, averaging in our Culpepper specimens, 26 and in the Tower specimens 27.5 millimeters in length. The measurements, however, in the two cases overlap, so that we can separate the Culpepper form only subspecifically from the Tower race.

Rothschild and Hartert make the Culpepper form a variety of *N. melanotis*. It differs, however, specifically from true varieties of *N. melanotis* in the blackish color of the back and the presence of the dark maxillary stripes.

The collection contains three adult males and two adult females taken on Culpepper in December.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus personatus hulli*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
5311	Culpepper.	♂		108	98	27	19	35.5
5308	"	"		112	110	26.5	19.3	34
5310	"	"	250	113	110	26	19	35
5307	"	♀		105	98	25	18.5	34.5
5309	"	"	230	106	100	26.5	19.3	33.5
Averages.			240	109	103	26	19	34.5

From the preceding descriptions it will be seen that the mockingbirds inhabiting the most northern islands of the archipelago, with the exception of Wenman, viz. Tower, Culpepper, Abingdon and Bindloe, are interrelated to one another in such a manner that they form four varieties of one species. They are all characterized by a melanistic tone to the feathers of the head and generally of the back, being thus distinguishable from those forms inhabiting the central and southern islands of the archipelago, which have a brownish tone pervading the upper parts. These northern forms must be named as varieties of the Abingdon race *N. personatus*, because this was the first one described; but their relationship is probably severally with the Tower race, *N. personatus hulli*, since this one most resembles the Chatham race to which the melanistic forms are probably related on account of the retention by most of them of the dark maxillary stripes, but from

which they are specifically separated by the color of the top of the head and the back.

80. THE NESOMIMUS MELANOTIS SERIES.

This group, as already stated, differs from the last, *N. personatus*, in having the central areas of the feathers of the back distinctly brown and not blackish. It inhabits Barrington, Indefatigable, Jervis, James, Albemarle, Narboro and Wenman. It has probably been separately derived from *N. adamsi* of Chatham. It comprises four subspecies. We describe these in the order of their apparent relationships, rather than according to priority of names. The name *melanotis* was first given to specimens of this species from James.

80*a*. NESOMIMUS MELANOTIS DIERYTHRUS Heller and Snodgrass.

Nesomimus melanotis (in part) GOULD, Voy. Beagle, III, Birds, p. 62, 1841. — RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 489, 1896.

Nesomimus melanotis melanotis (in part) ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 145, 1899.

Nesomimus melanotis dierythrus HELLER AND SNODGRASS, The Condor, Vol. III, No. 3, May, 1901 (Indefatigable and Seymour Islands).

Range. — Indefatigable and the Seymours.

This form presents the first departure from the Chatham race along a line differing from that of the melanistic northern species, *N. personatus*, in the retention of the brown color of the upper parts of the Chatham species, and in the loss, from the beginning, of the dark maxillary stripes.

Subspecific Characters. — Very similar to *N. adamsi* of Chatham, differing from it specifically in never possessing any trace of maxillary stripes. Color of the back brown, averaging darker than on Chatham specimens; lores and auricular region blacker; never any spots on sides of breast; culmen averaging slightly shorter.

If Chatham specimens should be obtained not possessing maxillary stripes, then it and the Indefatigable form could not be specifically separated and the Chatham variety would have to be named *N. melanotis adamsi*, since *melanotis* was the first name given to any of the brown-backed forms. Although the color of the back intergrades between the two forms, yet that of the Indefatigable and Seymour specimens averages distinctly darker, lacking the almost rusty tone present on the Chatham specimens.

The collection contains two adult males and two adult females from Indefatigable Island, taken on the part adjoining the Seymour Islands,

three adult males and one adult female from the northern Seymour Island, and three adult males and three adult females from the southern Seymour Island, besides several immature specimens; all taken during the last of April and the first of May.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus melanotis dierythrus*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril	Tarsus.
4680	Indefatigable.	♂	241	103	101	23.5	16.5	35
4694	"	"	250	108	103	23.7	17	35.5
4664	"	♀	238	95	93	23	15	34
4693	"	"	243	103	103	22	15.5	34
4659	"			97	90	23	16	34
4587	North Seymour.	♂	238	110	106	22.7	16	36.5
4565	"	"	240	109	106	23.5	17	35.5
4568	"	"	242	113	108	23	16	34.7
4566	"	♀	229	102	107	22	16	34
4563	"			110	113	23.5	15.5	36
4620	South Seymour.	♂	244	109	103	23.5	17	36
4621	"	"	246	107	102	22.5	16.5	36
4635	"	"	228	104	95	22.5	15.5	35.5
4612	"	♀	238	104	96	21.5	15	34
4629	"	"	232	103	94	22	15	34
4646	"	"	240	103	95	23	15.5	35
Averages.			239	105	94	22.6	16	35

80*b*. NESOMIMUS MELANOTIS BARRINGTONI (Rothschild).

Nesomimus carringtoni ROTHSCHILD, Bull. Brit. Ornith. Club, Oct., p. 52, 1898 (Barrington Island.) (Name a misprint for *barringtoni*.)

Nesomimus melanotis carringtoni ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 145, 1899.

Nesomimus melanotis melanotis ROTHSCHILD AND HARTERT (in part), Novit. Zool., VI, p. 145, 1899 (Wenman).

Range. — Barrington and Wenman.

The *Nesomimus* of Barrington was separated by Rothschild from the James *N. melanotis* on the "longer and slenderer bill, shorter wing and generally paler upper surface." These characters hold in our specimens. The race is, however, rather related to the Indefatigable form than to the James race, resembling the former in the color of the head and back and differing from it in the greater length of the culmen, the length of the culmen in *N. m. barringtoni* averaging about 22.6 in length.

Rothschild and Hartert assign the *Nesomimus* of Wenman to the same variety as the James form, *N. melanotis melanotis*. Our specimens, however, are identical in every way with the Barrington Island specimens.

It is rather curious that the *Nesomimus* of this island so far to the north should be related to forms of the central islands rather than to those of the neighboring islands, Culpepper and Abingdon.

We have five adult males from Barrington taken in May, and two adult males and two adult females from Wenman taken in December.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus melanotis barringtoni*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
3862	Wenman.	♂	240	109	109	26	19	34
3861	"	"	230	109	109	25.3	18	34
3858	"	♀	221	102	101	24.5	18.3	32.5
3860	"	"	215	102	95	24.7	17	33
Averages.			226	105	100	25	18	33.4
4961	Barrington.	♂	240	104	102	25	18	32
4935	"	"	245	109	104	25.5	18.5	34
4966	"	"	257	103	106	26	18	34
4909	"	"	233	108	87	26	19	33
4974	"	"	254	110	99	27.5	20.3	35
Averages.			246	107	100	26	18.6	33.6

80*c*. NESOMIMUS MELANOTIS MELANOTIS (Gould).

Orpheus melanotis GOULD, Proc. Zool. Soc. Lond., p. 27, 1837.
Mimus melanotis GOULD, Voy. Beagle, III, Birds, p. 62, 1841 (Chatham and James Islands). — SALVIN, Trans. Zool. Soc., IX, p. 471, 1876 (Charles ?, James and Indefatigable Islands).
Nesomimus melanotis RIDGWAY, Proc. U. S. Nat. Mus., XIX, p. 489, 1896.
Nesomimus melanotis melanotis ROTHSCHILD AND HARTERT (in part), Novit. Zool., VI, p. 145, 1899 (James, Jervis).

Range. — James (and Jervis ?).

This form is very close to the Indefatigable race, but is separable from it as a variety by the darker tone of coloration on the head and back, and by the longer bill — the culmen of our specimens from James averaging 24.6 while that of the Indefatigable and Seymour specimens averages only 22.6.

The collection contains four adult males, four adult females, and numerous immature specimens taken on James in April.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus melanotis melanotis*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
4514	James.	♂	242	108	106	25	17.5	37
4546	"	"	253	113	113	24	18	36
4600	"	"	250	110	108	25	18.3	36
4572	"	"		113	111	25.7	18	38
4472	"	♀	253	110	105	26	19	37
4606	"	"	248	106	106	23.5	16.5	35
4557	"	"	242	106	108	23	16.3	36
Averages.			248	109	108	24.6	17.6	36.4

8o*d*. NESOMIMUS MELANOTIS PARVULUS (Gould).

Orpheus parvulus GOULD, Proc. Zool. Soc. Lond., p. 27, 1837.
Mimus parvulus GOULD, Voy. Beagle, III, Birds, p. 63 1841 (Albemarle Island). — SALVIN, Trans. Zool. Soc., IX, p. 472, 1876. — SHARPE, Cat. Birds Brit. Mus., VI, p. 350, 1881.
Nesomimus parvulus RIDGWAY, Proc. U. S. Nat. Mus., XII, p. 102, 1889.
Nesomimus parvulus parvulus ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 146, 1899.
Nesomimus affinis ROTHSCHILD, Bull. Brit. Ornith. Club, p. 53, 1898.
Nesomimus parvulus affinis ROTHSCHILD AND HARTERT, Novit. Zool., VI, p. 146, 1899.

Range. — Albemarle and Narboro.

We have a large series of *Nesomimus* from Tagus Cove, Elizabeth Bay and Iguana Cove on Albemarle and from the north and east sides of Narboro, and we cannot discover any character separating the specimens from the two islands into two varieties. Rothschild and Hartert have described the Narboro birds as a subspecies of "*N. parvulus*."

This variety is most closely related to *N. m. melanotis* of James, from which it is distinguishable by the general smaller size, specially smaller bill and darker coloration of the upper parts. All the characters, however, completely intergrade, so that the form cannot be retained as a separate species.

It is evident that the line of development from the Chatham form has been through the Indefatigable form to the James and from the latter to the Albemarle-Narboro form, for all of these are linearly related to one another in the order given. The general tendency has been toward a darkening of the color of the upper parts. The Chatham specimens have the lightest shade to the feathers of the top of the head and the back, and those of Albemarle and Narboro the darkest.

MEASUREMENTS OF ADULT SPECIMENS OF *Nesomimus melanotis parvulus*.

Cat. No. Stan. Univ. Mus.	Locality.	Sex.	Length.	Wing.	Tail.	Culmen.	Maxilla from Nostril.	Tarsus.
5258	Albemarle, Tagus Cove.	♂	243	115	103	22.5	15	34.5
4114	" " "	"	238	113	113	21.5	15	35.5
4010	" " "	"	240	109	111	21	15	37
4212	" " "	"	236	106	108	23	16.7	35
4375	" " "	"	243	108	104	22	15	34.5
4038	" " "	♀	228	98	105	22	15	34.7
4025	" " "	"	221	96	100	21.5	15	33.5
3936	" " "	"	230	105	107	21.3	14	37
3979	" " "	"	228	101	104	21	14.3	34
3932	" " "	"	232	99	108	22.5	15	33
4231	" " "	"	240	102	110	22	15	35
4100	" Iguana Cove.	♂	220	106	106	20.5	14	37
3959	" " "	"	230	108	108	21.7	16.3	
3964	" " "	♀	225	99	101	21	14.3	35
4221	" Elizabeth Bay.	♂	230	111	111	21	15	35.5
4306	" " "	"	245	105	114	21.7	15	37
4253	" " "	"	238	110	105	21	15	36.5
4284	" " "	"	231	107	105	21	14	35.5
4307	" " "	"	240	109	108	20.5	15	37
4300	" " "	"	245	115	105	22.5	16	36
4256	" " "	♀	226	102	98	21	14.5	35
4254	" " "	"	235	109	118	21	15	36
4229	" " "	"	222	99	104	21	15	36.5
4252	" " "	"	238	103	105	21	15	34.5
4227	" " "	"	232	104	106	22	15.3	36.5
Averages.			230	105	107	21.5	15.3	35.6
4430	East side of Narboro.	♂	245	109	105	22.5	14.7	36.5
4165	" "	"	246	111	109	22	14.7	35
4131	" "	"	235	111	114	22	16	33.5
4126	" "	"	248	111	117	23	16	38
4137	" "	"	226	107	113	22	16	36.5
4143	" "	♀	233	102	100	22	15.5	34
4172	" "	"	235	101	104	22	14.3	36.5
4156	" "	"	226	100	98	21.7	14.7	35
3999	North side of "	♂	248	109	117	22.3	15	36
3990	" "	"	232	109	111	22.5	15.7	35
3969	" "	♀	222	102	103	22	16	35.5
3928	" "	"	242	107	108	22	16	35
3967	" "	"	231	100	107	23.5	15	35.5
4044	" "	"	220	98	100	22	15	35
4502	" "	"	235	97	102	21	14.7	33
Averages.			235	105	107	22.2	15.2	35

Some of the Narboro specimens are so dark that the color can scarcely be distinguished from that of the Bindloe birds. The bills of the Bindloe specimens also are of the same size as those of the Albemarle

and Narboro specimens, and specimens may be selected from each set having almost no distinguishing mark whatever between them. This is very evidently a case of convergent evolution, for the general tone of coloration of the upper parts of the Albemarle-Narboro birds is brown, resembling that of the James and Indefatigable specimens, while that of the Bindloe specimens is dusky, resembling that of the Abingdon, Tower and Culpepper specimens.

The collection contains five adult males and six adult females taken at Tagus Cove, Albemarle, during January and March; two adult males and one adult female taken at Iguana Cove, Albemarle, the last of December; six adult males and five adult females taken at Elizabeth Bay, Albemarle, in February; and seven adult males and eight adult females from the east and north sides of Narboro Island in January, March and April. Besides these we have numerous immature birds.